# "DESIGN & FABRICATION OF HYDRAULIC PRESS" (Review)

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Abstract—***A hydraulic press is a machine using a hydraulic cylinder to generate a compressive force. Frame and cylinder are the main components of the hydraulic press. In this project press frame and cylinder are designed by design procedure. The frame and cylinder are modelled by using modelling software CATIA. Using the optimum resources possible in designing the hydraulic press components can effect reduction in the cost by optimizing the weight of material utilized for building the structure. An attempt has been made in this direction to reduce the volume of material. So in this paper consideration for an industrial application consisting of mass minimization of H frame type hydraulic press.***

Keywords—***Joystick ,Gear box ,Dc Motor , Stair with case.***

## I. INTRODUCTION

A hydraulic press is a device (see machine press) using a hydraulic cylinder to generate a compressive force.It uses the hydraulic equivalent of a mechanical lever, and was also known as a Bramah press after the inventor, Joseph Bramah, of England. He invented and was issued a patent on this press in 1795. A hydraulic press is a machine using a hydraulic cylinder to generate a compressive force. Frame, hydraulic cylinder and press table are the main components of the hydraulic press. Hence a hydraulic press is a machine that makes use of the pressure exerted on the fluids to crush, straighten or mould. The concept of the hydraulic press is based on Pascal's theory, which states that when pressure is applied on fluids in an enclosed system, the pressure throughout the system always remains constant. In hydraulic press, the force generation, transmission and amplification are achieved using fluid under pressure. The liquid system exhibits the characteristics of a solid and provides a very positive and rigid medium of power transmission and amplification. In a simple application, a smaller piston transfers fluid under high pressure to a cylinder having a larger piston area, thus amplifying the force. There is easy transmissibility of large amount of energy with practically unlimited force amplification.

## II. WORKING PRINCIPLE

A hydraulic press is a machine that uses pressurized liquid to create force. These machines are composed of a simple cylinder and piston mechanism. The press consists of a large cylinder, with a large piston, and a small cylinder and a small piston. The large cylinder and the small cylinder are connected to one another by means of a pipe. The two cylinders, and the pipe connecting them, are filled with a liquid. At this point, the function of the hydraulic press depends on Pascal's Principle.

***Fig. 1*** *Model of Hydraulic press*

Pascal's Principle states that when pressure is added to a liquid at rest, there is an identical increase in pressure at all points. Applying this principle to the hydraulic press means that any force that is added to the piston in the smaller cylinder will be transferred to the piston in the larger cylinder, in a proportionally increased level of force. This allows a

hydraulic press to produce a great deal of force from the application of a small amount of force to the small piston. The increase of the force produced by the larger piston is proportionally larger than the force exerted on the small piston The amount of increase depends on the ratio of the sizes of the pistons. The ratio of the areas of the two pistons is multiplied by the amount of force applied to the small piston to determine the amount of force that the large piston can produce. For example, if the ratio of the sizes of the two pistons is 10, and the amount of force applied to the small piston is 50 N, the amount of force that the large piston will produce is 500 N. Hydraulic presses can be used in any task that requires a large amount of force. These can include any type of lifting as well, since the hydraulic press can work as a type of lever. These presses are the most efficient contemporary press, as well as the most common. Since the hydraulic press works on the basis of Pascal's Law, its working is similar to the one of the hydraulic system. A hydraulic press consists of basic components used in a hydraulic system that includes the cylinder, pistons, the hydraulic pipes, etc. The working of this press is very simple. The system comprises of two cylinders, the fluid (usually oil) is poured in the cylinder having a small diameter. This cylinder is known as the slave cylinder. The piston in this cylinder is pushed so that it compresses the fluid in it that flows through a pipe into the larger cylinder. The larger cylinder is known as the master cylinder. The pressure is exerted on the larger cylinder and the piston in the master cylinder pushes the fluid back to the original cylinder. The force applied on the fluids by the smaller cylinder results in a larger force when pushed in the master cylinder. The hydraulic press is mostly used for industrial purposes where a large pressure is required for compressing metals into thin sheets. An industrial hydraulic press uses the material to be worked upon along with the help of the press plates to crush or punch the material into a thin sheet.

## FINDING OF LITRATURE & REVIEW

Using the optimum resources possible in designing the hydraulic press components can effect reduction in the cost by optimizing the weight of material utilized for building the structure. An attempt has been made in this direction to reduce the volume of material, cost of the press and to make is portable. Ertl et al. presented a 2D nonlinear magneto-mechanical analysis of an electromagnetic actuator based on finiteelements. The presented method enables the simulation of the complete switching cycle off a switching, short stroke solenoid actuators with sufficient accuracy. This could be achieved by considering nonlinear magnetics, eddycurrent induction and a physical correct implementation of the contact mechanics, which are relevant forthe complex dynamics of this valve types. Combining the concepts of pre-magnetization as well as over excitation to optimize the actuator dynamics, the pure valve needle flight time at valve opening can be reduced to 200ms. Thedeveloped numerical tools enable a systematic study of several methods to optimize the dynamics. Pohletal. presented a model of a fast 2/2 switching valve where both the magnetic pathas well as the spool assembly are modeled. The model also includes a description of the hysteresis characteristics of the magnetic path. An optimization strategy has been utilized in order to parameterize the model against measured data. However, even for major deviations from the operational point used for the model adaptation, the model predicts the valve response sufficiently accurately. The switching cycle was less than 10 ms.

## MANUFACTURING PROCESS

Hydraulic presses are available in many types of construction which is also true of mechanical presses. Following construction details just gives the basic idea of dimensions of different parts used in the design module. Base is manufactured from 75x40 mm two c-channel of length 380 mm welded together .The height can be adjusted using rods. The die used for a particular given shape is welded at the bottom plate. The dimensions of the frame is 725x380 mm of c-channel of 75x40 mm with two support of c-channel Spring having free length 230 mm is fixed between middle plate and frame so as to get the flexible movement of the Movable plate. Punch is welded at the bottom of the movable plate. Jack is mounted in between the frame and middle plate. The basic Manufacturing process is shown in below figure.

**Fig 2.** Hydraulic press

DESIGN APPROACH

Table I includes details of all components required for building the actual model of hydraulic press.

Table I. Details of components

| SR.NO | NAME OF PART | MATERIAL USED |
|---|---|---|
| 1 | BASE | MILD STEEL |
| 2 | MOVABLE PLATE | MILD STEEL |
| 3 | SPRING | MILD STEEL |
| 4 | UPPER PLATE | MILD STEEL |
| 5 | JACK | MILD STEEL |
| 6 | BODY | CAST IRON |
| 7 | DIE | MILD STEEL |
| 8 | PUNCH | MILD STEEL |
| 9 | FRAME | MILD STEEL |

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