

5ton hydraulic press machine

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ABSTRACT

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. In this project press frame, cylinder and press table are designed by the design procedure. They are analyzed to improve their performance and quality for press working operation. 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 we consider an industrial application project consisting of mass minimization of H frame type hydraulic press. This press has to compensate the forces acting on the working plates and has to fulfill certain critical constraints. Here we use implementation for analysis and optimization of hydraulic press. The aim of this paper is to integrate the mechanical system of hydraulic press with hydraulic system to facilitate the ease of operation to manufacture the smaller parts in a bulk. In the present scenario, time constrain is a crucial part for completion of any production process. Thus with the aid of automization, the production time can be reduced as well as higher degree of accuracy can be achieved as the human efforts will be alleviated. Thus an attempt has been made to provide the smooth and rapid functioning of press work with the help of hydraulic system.

1.INTRODUCTION

Hydraulic press is a tool to produce compressive force by means of fluid. It depends upon Pascal's principle that the pressure throughout an enclosed entity is constant. By means of hydraulic system larger forces can be produced in contrast with mechanical and electrical systems. Such forces can be used for the press work application such as blanking, punching, piercing, coining, trimming etcetera. Press work is a method of mass production involving the cold working of metals, usually in the form of thin sheet or strip. Press working is one of the extensively employed methods of fabricating parts of intricate shapes with thin walls. Press working processes make use of large forces by press tools for a short time interval which results in cutting or shaping the sheet metal. Since press working does not involve heating of the parts, close tolerances and high surface finish can be obtained on the part. Since presses can produce components at fairly fast rates, the unit cost of labor for operating the press is fairly low.

Press working forces are set up, guided and controlled in a machine referred to as a Press. Thus an attempt has been made to optimize the process of press work using Hydraulic mechanism in press machine. The inputs and outputs of the control system including hydraulic mechanism are solely mechanical such as rotating shaft or reciprocating plunger. The prime remuneration of implementing this system is the movement of the mechanical devices can be operated by means of hydraulic components such as actuators to initiate the movement which could be in the form of lever to apply manually or by means of switches to operate automatically. Furthermore, direction control valves have been implemented to control the directions of piston movements and regulate the same. Thus the whole mechanism has been simplified with the use of hydraulic equipment's. Moreover, the use of pressure control valve and direction control valves, makes it easier to regulate the forces and control the speed of the setup.

2.LITERATURE SURVEY

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. Errol et al. presented a 2D nonlinear magneto-mechanical analysis of an electromagnetic actuator based on finite elements. 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 magnetic, eddy current induction and a physical correct implementation of the contact mechanics, which are relevant for the complex dynamics of this valve types. Today I'd like to discuss Hydraulic presses. Yes I know a broad subject so we are going to take it down to the basics give you a layman's description and give you a little history. After searching the web and showing my findings to my techs the most basic description of a Hydraulic press which is a machine tool and used in the manufacturing industry was found on wiseGeek.com here it. "A hydraulic press is a mechanical machine used for lifting or compressing large items. The force is generated through the use of hydraulics to increase the power of a standard mechanical level. This type of machine is typically found in a manufacturing environment". A good description of "hydraulic systems" and Pascal's Law which is what hydraulics is based on can be found on NASA's website I have copied it below. Hydraulic systems use an incompressible fluid, such as oil or water, to transmit forces from one location to another within the fluid. Pascal's law states that when there is an increase in pressure at any point in a confined fluid, there is an equal increase at every other point in the container. Brahma was a very resourceful individual and worked as a farmer, carpenter and locksmith. But his love was inventing and improving on the designs of other inventions. He invented a lock called the Brahma Lock and was the owner and operator of "the Brahma Lock Company" The lock he developed was the undisputed safest lock at that time and held that record for 67 years. He also improved upon the design of the modern day toilet and obtained the patent for it in 1778. Hydrostatic press for uprooting trees Bramah also held patents for the first extrusion process for making lead pipes and another for making gun stocks (patent 2652). Also noted in several resources was Braham's insistence on quality control; he understood by machining to close tolerances machines especially engines ran better. He taught this to Arthur Woolf a Cornish steam engineer. With Braham's guidance Woolf's engines ran with high pressure steam which greatly increased their output. Woolf's designs were soon used by all engineer designers of that time period. Some would consider Bramah the father of quality control. IV. Problem Statement and Objective: Problem Statement:

► Problem Statement Oil Leaks One of the most reported problems is an oil leak; you will notice oil around the ram, the hose end fittings and hydraulic lines. Make sure you are using the recommended oil for your hydraulic press and that all fittings are tightened.

► Overheating Overwhelming pressure and friction, and contaminated or degraded hydraulic fluid, can cause your press to overheat. Hydraulic presses should never reach a higher temperature than 150° F, as overheating can cause damage to sealing compounds. Make sure you don't overwork your press, and regularly replace the oil and clean the filters. ► Slow Pressure Build-Up Normally, hydraulic presses should reach required pressure levels in around one second, any longer than this means that there is a problem with the pump; the fluid is not being funneled to the ram quickly enough. This may be caused by leaks or dirt caught in the fluid, so make sure you examine the pump, as well as surrounding mechanisms like the relief valve and motor, to make sure everything is working properly and clean.

Fig: . Assemble of Metal Parts

We used 5 ton bottle jack to make this hydraulic press. Also I used 2 mechanical springs to allow the hydraulic jack in its first position. Both the hydraulic jack and springs are attached with the frame by using of bolts. Springs are attached by using of J bolts

3.WORKING PRINCIPLE

Hydraulic press is a system where a liquid, usually crude oil, is pumped down hole under high pressure to operate a reciprocating pump or a jet pump. This is a very flexible pumping system and can be used to produce low- to high-volume wells. This system is capable of producing a higher volume of fluid than the mechanical lift pump. Hydraulic lift uses a pump and pumps oil very high pressure. The pump pressure is usually between 300-400 pounds per square inch and pushes the liquid to the bottom of the piston to lift it from its seat which relatively lifts the load connected to the head of the piston-cylinder assembly. The required power oil or produced water is reclaimed and reused to continue operating the wells. The pump produces oil on both the upstroke and the down stroke. The pump stroke speed is not easily adjustable due to varying load.

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.

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.

Assembled Parts of Hydraulic Press Machine



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.

4. REFERENCES

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