

A Review of Literature on Design of Horizontal Press Machine

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Abstract— Hydraulic press is a tool that functions by either, fluid pressure or hydraulic pressure. It is based on Pascal's principle which states that the pressure throughout an enclosed entity is constant. In horizontal hydraulic presses the forces exerted by the pressurized fluid on a piston by means of manual or powered pumping element can be used for the press work operation such as blanking, punching, piercing, coining, trimming etc. This project is based on the requirement of G.S. Industries. The industry facing a problem of assembling and dismantling of heavy parts such as couplings, shaft, bearing and gears. Thus, it is very inconvenient to perform such operation on regular vertical press machines. So there is a need to design a horizontal press machine as a special purpose machine tool.

Key words: Hydraulic Press, Amplification

I. INTRODUCTION

Hydraulic press is a device using a hydraulic cylinder to generate a compressive force. There is easy transmissibility of large amount of energy with practically unlimited force amplification. It has also a very low inertia effect. It uses the hydraulic equivalent of a mechanical lever, and was also known as a Bramah press after the inventor, Joseph Bramah, of England. 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.



Fig. 1: Example of Horizontal Hydraulic Press Machine

II. LITERATURE REVIEW

A. Mihai Talu, Stefan Talu

The aim of this paper is to analyses through the finite elements method (FEM) the press ram-linear hydraulic motor piston assembly from horizontal Hydraulic Press – 2 MN. The analysis of ram-piston assembly was made for determination of stresses, displacements, deformations and the factor of safety distribution. A three dimensional model of the ram-piston assembly with a complex geometry was generated based on the designed data. The Finite Elements Analysis was performed using Solid Works 3D CAD Design and COSMOS Works software. The simulation results were evaluated and compared to the experimental data. Results show that the established FEM model provides useful information for the ram-piston assembly optimal design.

B. M. Fulland

Within this paper the fatigue crack growth in the frame of a hydraulic press will be discussed. The crack growth started at a shrink hole in a notch in the middle part of the frame. The state of stress of the crack is predominantly influenced by the notch, which induces a Mixed-Mode-loading during the crack growth. The propagation of the crack will be analyzed with the crack simulation program ADAPCRACK3D, which has been developed at the Institute of Applied Mechanics at University Paderborn. This program is able to calculate fully automatic the stress intensities along a 3D-crack front as well as the crack path and the lifetime of a structure.

C. Rakesh. A. Oza, S. P. Patel

In current market, drive shaft is most important component to run the application, because of failure of shaft tends to stop the production line or manufacturing of the components. A Drive shaft is a rotating shaft that transmits power from the motor to the gear box. Drive shaft must operate in high and low power transmission of the fluctuating load as required in eccentric mechanical press. Due to this type of fluctuating load drive shaft is fail. Thus it is important to make this shaft as per load requirement to avoid this failure. In this paper, first the model is prepare on the pro/Engineer software and after that the analysis work on the ANSYS for comparing the different such as bending stress, shear stress, and deflection of the shaft for existing condition as well as the new design which one developed for this condition. Then weight reduction is check by using EGlass/Epoxy and HM-Carbon / Epoxy materials

D. Rajdipsinh G Vaghela, Ravi C Patel, Kanaksinh Gohil

Presses are used in industries for a wide variety of uses including blanking, piercing and pressing. There are many different types of presses. The most popular are pneumatic

presses and hydraulic presses. Pneumatic presses are 10 times faster than hydraulic presses and they can perform many jobs faster and more efficiently. Metal forming is one of the manufacturing processes which are almost chip less. These operations are mainly carried out by the help of presses and press tools. These operations include deformation of metal work pieces to the desired size by applying pressure or force. Press machine always work under impact load condition. Because of continuous impact the load, frame of press machine always experience continuous tensile stress.

E. B.Parthiban, P.Eazhumali, S.Karthi, P.Kalimuthu

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 the design procedure. Press frame and cylinder are analysed to improve its performance and quality for press working operation. Structural analysis has become an integral part of the product design. The frame and cylinder are modeled by using modeling software CATIA. Structural analysis has been applied on C frame hydraulic press structure and cylinder by using analysing software ANSYS. An integrated approach has been developed to verify the structural performance and stress strain distributions are plotted by using ANSYS software. According to the structural values the dimensions of the frame and cylinder are modified to perform the functions satisfactory

F. H. N. Chauhan M. P. Bambhanian

Metal forming is one of the manufacturing processes which are almost chip less. These operations are mainly carried out by the help of presses and press tools. These operations include deformation of metal work pieces to the desired size and size by applying pressure or force Press machine always working under impact load condition. Because of continuous impact load, frame of press machine always experience continuous tensile stress. Press machine continuously deals with stress and because of that frequently structural failure problem occurred in machine. Instead of sharp corner in C-plate fillet is provided, then it is useful to reduce failure in structure. Amount of fillet is depends on load condition experienced by frame and that can be analyzed by using FEM Tool. It is also helpful to reduce thickness of plate of frame structure so that material saving and cost benefit will be considerable.

G. AbhijeetS. khandekar, Vivek Padole

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phase of the study, conventional design calculations proposed by Indian Standard Rules were performed. The press design was modelled with solids, Loads and boundary conditions were applied to solid model. Assign material to the solid model. Finite Element meshes were generated from the solid model. After a comparison of the finite element analyses, and the conventional calculations, the analysis was found to give the most realistic results. As a result of this study, a design optimization for a heavy duty meal forming hydraulic press has been done.

III. DATA ACCUMULATION

Existing Vertical Press Machine at G.S. Industries:



Fig. 2: Vertical Press Machine at G.S. Industries

- Minimum weight of the job: 25 KGS
- Maximum weight of the job: 1500 KGS
- Maximum length of the job: 1.8 M
- Minimum length of the job: 200 MM
- Mode of operation: Manual
- Number of labor: 5
- Time for completing one job: 1 to 4 hours
- Maximum pressing force of the machine: 4 tons

IV. NEED OF HORIZONTAL HYDRAULIC PRESS MACHINE

- G.S. Industries is a maintenance and manufacturing industry in central India.
- They work on repair, maintenance and overhauling of heavy engineering equipment's such as driveshaft's and gearboxes of heavy machineries.
- There is a regular need of assembling and dismantling of heavy parts such as couplings, shaft, bearing and gears
- It is very inconvenient to perform such operation on regular vertical press machines
- Thus there is an urgent need to design a horizontal press machine as a special purpose machine tool.
- Also they will be benefited with cost and time minimization

V. PLAN OF WORK

- Data accumulation
- Literature survey
- Design calculation of Horizontal press machine.
- CAD modeling of the Horizontal press machine.
- Analysis of design in FEA.
- Modification of the design if needed.
- Analysis of modified design in FEA.
- Result discussion
- Design finalization

VI. CONCLUSIONS

With successful completion of this project, the company G.S.Industries will be benefited from the advancements of computer technologies and thus will be able to increase production with the help of horizontal hydraulic press machine.

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