“ANALYSIS OF HORIZONTAL HYDRAULIC PRESS MACHINE”

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Abstract—There is often a need for a partial or complete disassembly and assembly of large components and subassemblies. These assemblies and subassemblies have large dimensions and weight, they operate in dynamic conditions and very hard environments and that is the reason why large forces of separation or pressing appear during assembling and disassembling. To perform these operations, the most acceptable solution is a horizontal hydraulic press with a hydraulic table to hold the components and parts in the axis of pressing or separation.

It is the final part of the paper. This paper mainly based on the Finite Element model and FE analysis results. The results were demonstrated in the next chapters.

Keywords—Hydraulic, Horizontal press machine, CAD,

I. INTRODUCTION

The very basic working principles of the hydraulic press are easy and simple, and depend on differences in fluid pressure. Fluid is pumped into the cylinder below the piston; this causes the fluid pressure under the piston to maximize. At the same time, fluid is pumped out of the top channel, resulting in the fluid pressure above the piston to decrease. A higher pressure of the fluid below the piston than the fluid over it causes the piston to rise. In the later step, fluid is pumped out from below the piston, causing the pressure under the piston to decrease. Simultaneously, fluid is pumped forcefully into the cylinder from the top; this increases the fluid pressure above the piston. A higher pressure of the fluid above the piston, than the fluid below it, moves the piston downward.

II. OBJECTIVES

➢ Design and analysis of horizontal hydraulic press machine.
➢ To reduce labor time of manually assembling and dismantling of heavy parts such as large industrial couplings, shafts and bearing etc.
➢ To ensure safety of workers.
➢ To reduce the cost of labour involved in assembling and dismantling of heavy parts such as large industrial couplings, shafts and bearing etc.

III. FINITE ELEMENT MODELING

The Finite Element Method is applied for design of a variety of structures. This method is a numerical procedure for analysis of structures. Usually the problem addressed is too complicated to be solved by classical or analytical methods.

A finite element model of Horizontal Hydraulic Press Machine has generated using CAD model in HyperMesh. Based on the geometry dimensions suitable element configurations applied for meshing. Mesh was generated according to the set criteria. Material and elemental properties were assigned to the mesh and proper constraints and forces applied to the mesh model for analysis purpose.
FE Model of Horizontal Hydraulic press

IV. BOUNDARY CONDITION

The boundary condition is the application of a force and/or constraint. In Hyper Mesh, boundary conditions are stored within what are called load collectors.

**Constraints:**

![FE Model of Horizontal Hydraulic press](image)

**FORCES:**

200ton X 9.81 = 1962 KN. In Both Direction along the Longitudinal Axis

![FE Model of Horizontal Hydraulic press](image)

V. FINITE ELEMENT ANALYSIS

Finite Element analysis is a method that helps to simulate mechanical parts and systems to get information about failure, deformation and stresses under some various kind of loadings.

It is a numerical approach by which a general differential equation can be solved in an approximate manner. The solution that we are going to get from finite element method is an approximate, and in some cases, this approximate solution may match with exact solution.
STATIC Analysis:

Displacement obtained from linear static analysis is 1.58mm

Stress obtained from linear static analysis is 359MPa

VI. CONCLUSIONS

This project involved gathering the design data, CAD model generation, FE model generation, and carrying out finite element analyses (static).

From the results of design, we concluded that stresses obtained in static analysis are within the limits. Hence the design of Horizontal hydraulic press machine is safe.

REFERENCES

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