

# Design and FE Results of Modified Hydraulic Press Machine

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**Abstract**— A hydraulic press is a device which uses a hydraulic cylinder to generate a compressive force. The pressure of fluid in the cylinder can be increased or decreased by the use of pumps, and valves. The compressive force depends on the structural design of the frame that determines the required rigidity. In this project the design optimization & structure analysis of heavy duty metal forming hydraulic press has been proposed. The modification of major components like frame, bottom plate, bed, top box of one cylinder with four post hydraulic press, so that rigidity and strength of the components are increased by using optimum material. The structural analysis & design of optimized hydraulic press has been done and comparative study of results of finite element analysis of a press with 80 ton capacity has been conducted.

**Key words:** Hydraulic press, FE Results

## I. INTRODUCTION

In hydraulic press machine, the force generation, power transmission and amplification are achieved by using fluid under pressure. The basic working principles of the hydraulic press are simple, and rely on differences in fluid pressure. Fluid is pumped into the cylinder from below of the piston, this causes the fluid pressure under the piston to increase. Simultaneously, the fluid is pumped out of the top channel, causing the fluid pressure above the piston to decrease. The high pressurized fluid below the piston than the fluid above it causes the piston to rise. In the next step, fluid is pumped out of the cylinder from below the piston, causing the pressure under the piston to decrease.

### A. Objective:

Main objective of this project is to modify major components of one cylinder with four post hydraulic press so that rigidity and strength of the components are increased by using optimum material. The function of the major component like frame, bottom plate, bed, top box are to absorb the forces, to provide precise slide guidance, to support the drive system and other auxiliary unit. The structural design of the component depends on the pressing force that determines the required rigidity. The existing machine does not have high rigidity and needs to be redesigned.

### B. Methodology:

- Modeling of 3-d press machine using solid works
- Static analysis of the model in order to solve the problem formulation
- Optimization of the model

## II. MODIFIED CAD MODEL

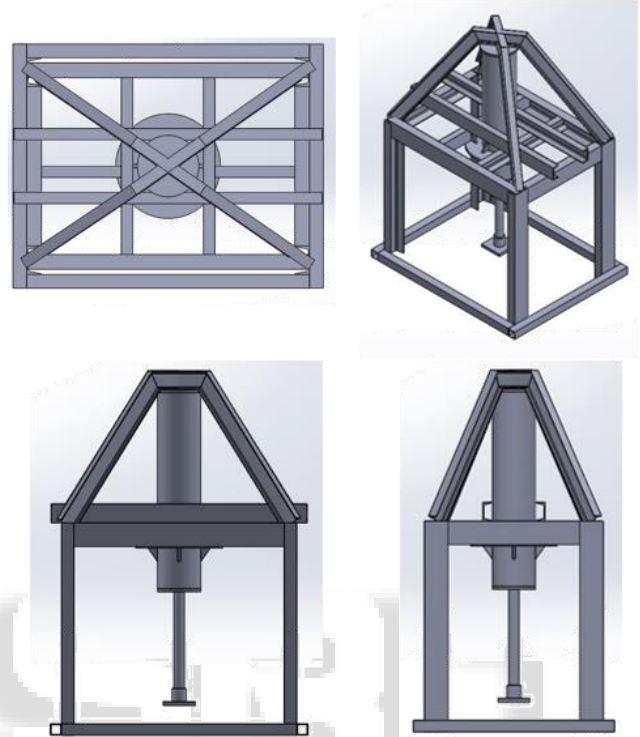


Fig. 1:

### A. Meshing Of Modified Model:

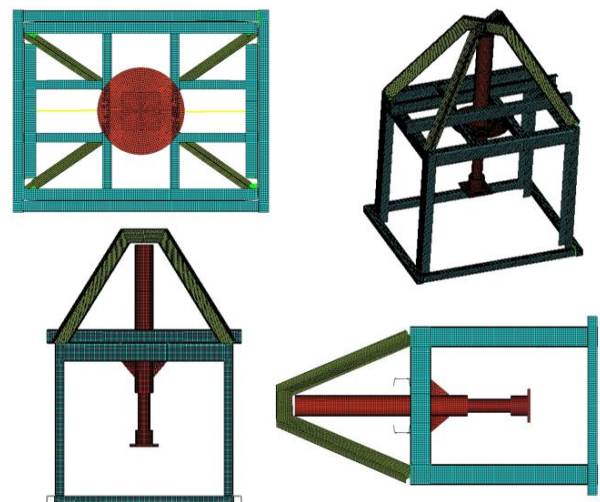


Fig. 2:

B. Boundary Conditions: Constraint

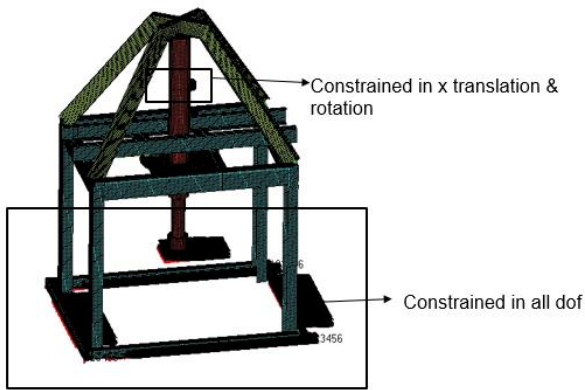


Fig. 3:

C. Forces:

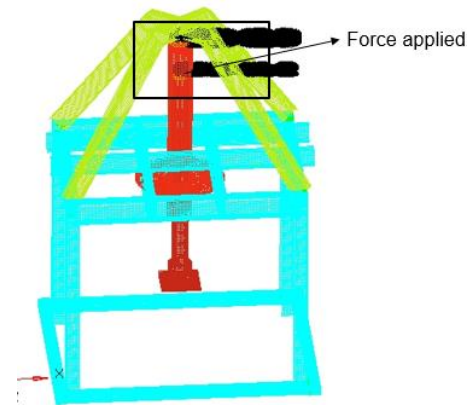


Fig. 4:

D. FE Results of Modified Model:

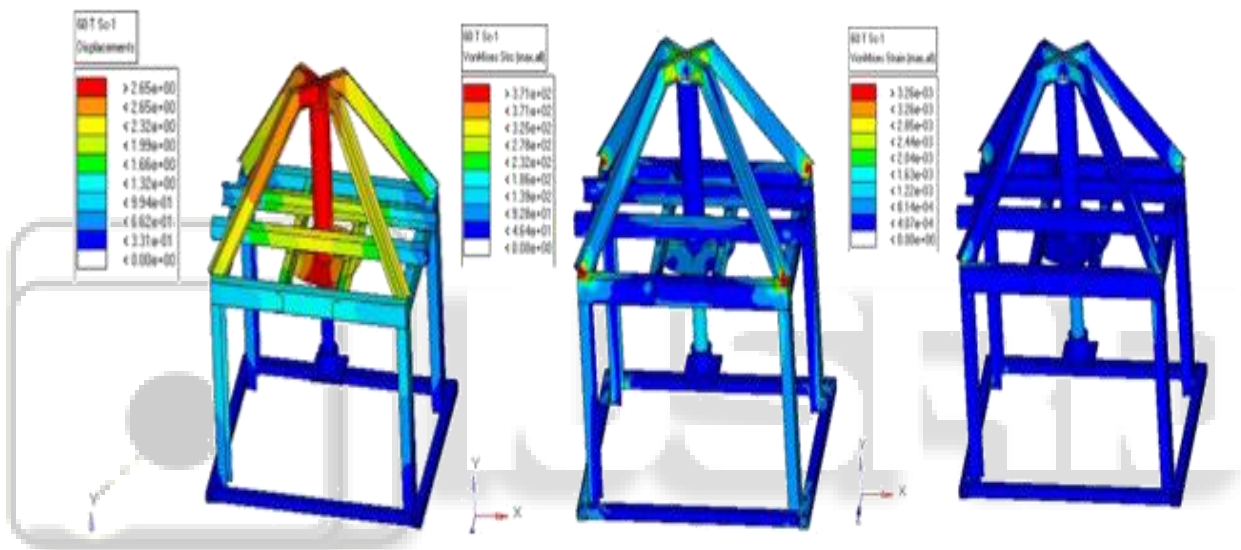


Fig. 5:

III. CONCLUSIONS

By undertaking this project, major component of one cylinder four post hydraulic press machine will be redesigned and optimized so that it has sufficient strength and stiffness. As it is evitable that the stress of the previous design was high and the stresses of the modified design are less.

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