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A Review on Design, Analysis and Optimization of Plate bending Machine

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Abstract— In these types of presses, press-body is of C Shaped. When free space required from three sides of press table to work for loading and unloading of pressed component then this type of presses are designed. As main cylinder placed eccentric to central axis of press-body, it applies eccentric load on press-body hence heavier press body is required as compared to same capacity of other type of press. These types of presses are also called as single press.

Keywords—Press table,cylinder, Central axis, Press-body, heavier body.

INTRODUCTION

Sheet metal fabrication plays an important role in the metal manufacturing world (Cloutier, 2000). Sheet metal is used in the production of materials ranging from tools, to hinges, automobiles etc. Sheet metal fabrication ranges from deep drawing, stamping, forming, and hydro forming, to high-energy-rate forming (HERF) to create desired shapes (Cloutier, 2000). Fascinating and elegant shapes may be folded from a single plane sheet of material without stretching, tearing or cutting, if one incorporates curved folds into the design (Martin et al., 2008). Shape rolling of sheet metal is the bending continually of the piece along a linear axis.

In Plate bending machine, 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. It has also a very low inertia effect.

LITERATURE REVIEW

Muni Prabaharan and V.Amarnath [1] Structural optimization tools and computer simulations have gained the paramount importance in industrial applications as a result of innovative designs, reduced weight and cost effective products. Especially, in aircraft and automobile industries, topology optimization has become an integral part of the product design process. In this project, topology optimization has been applied on various components of scrap baling press and 5Ton hydraulic press using NASTRAN WORKBENCH software. Suitable loads and constraints are applied on the initial design space of the components. An integrated approach has also been developed to verify the structural performance by using NASTRAN software. At the end, shape optimized design model is compared with the actual part that is being manufactured for the press. It is inferred that topology optimization results in a better and innovative product design. In this project, we showed 26.26 percent cost reduction in scrap baling press. And we fabricated 5ton hydraulic press with cost reduction of 24.54 percent.

B.PARTHIBAN1 , P.EAZHUMALI 2 , S.KARTHI 2 , P.KALIMUTHU [2]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 analyzed 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 NASTRAN. An integrated approach has been developed to verify the structural performance and stress strain distributions are plotted by using NASTRAN software. According to the structural values the dimensions of the frame and cylinder are modified to perform the functions satisfactory.

Ankit H Parmar, Kinnarraj P Zala, Ankit R Patel [3] The goal of structure optimization is to decrease total mass of hydraulic press while assuring adequate stiffness. Structural optimization tools and computer simulations have gained the paramount importance in industrial applications as a result of innovative designs, reduced weight and cost effective products. A method of structure optimization for hydraulic press is proposed in order to reduce mass while assuring adequate stiffness. Key geometric parameters of plates which have relatively larger impacts on mass and stiffness are extracted as design variables. In order to research relationship between stiffness, mass and design variables, common batch file is built by SOLIDWORKS and analysis is done in NASTRAN. Top plate, movable plate and column design and analysis done.

IDENTIFIED GAPS IN THE LITERATURE

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

CONCLUSION

The aim of the project is to modify major component of one cylinder four post hydraulic plate bending machine so that the rigidity and strength of the machine is increased.

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