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MODIFICATION AND IMPLEMENTATION OF LOWER LINK BUSH PRESS MACHINE

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ABSTRACT

A Hydraulics bush pressing machine is designed for pressing C.I. bushes into a Lower arm of SUV's. The machine is symmetrical about a vertical plane; A Hydraulics presses utilizing oil in its operation and gives higher outlet hydraulic pressure 50 to 70 kg. In this project the press is design and manufacture for pressing Bush into the circular casting part. Casting part is thick cylinder and bush is kind of cylindrical part. One actuator is used in the press for vertical pressing. This project includes the concept development, design, analysis and manufacturing of press machine. Various parts of the press are modeled by using Pro-E modeling software. This project focuses on designing of box type cage to be used in the fixture that used to ease of operation on machine of workers. The project idea basically developed from turning tables which are one type of fixture having ability to rotate about its axis and able to fix the component at any angle, so there is no requirement of angle plate and sine plates. which is fixed of .it is not possible to rotate or handle component manually and proceed on them to make this process accident proof and automated for this purpose we are designing a box type cage which rotate 360 degree and allow continue to process on the component.

1. INTRODUCTION

1.1 Objectives of the Project

The general objective of this paper is to design and validate by making fixture for ease of working of workers & improve productivity of existing hydraulic press machine at the case company .

Press working techniques utilizing large quantities of economical tooling equipment design and it quickly, accurately and economically cold working of mild steel and other ductile materials. The component produced range over an extremely wide field and is used throughout industry for economical production of quantities of pressing; consideration has to be given to the rate of production, the cost of the press tool to be employed.

Press may be defined as the chip less manufacturing process by which various `components are made from sheet. It uses large force by press tools far short time interval which results in cutting a shaping the sheet metal.

Poka-yoke is a quality improvement concept, coined by Shigeo Shingo in Japan during the 1960s who was one of the Industrial Engineers at Toyota. The initial term was Poka-yoke, which means fool proofing. Poka-yoke helps people and processes work right the first time. Poka-yoke refers to techniques that make it impossible to make mistakes. These techniques can drive defects out of products and processes and substantially improve quality and reliability. The use of simple Poka-yoke ideas and methods in product and process design can

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eliminate both human and mechanical errors. Thus, Poka Yoke is central to the concept of Lean thinking, which aims to reduce waste and make sure that everything and every process is as efficient as possible.

The concept of stopping defects or mistakes from happening is central to Poka Yoke thinking. It is not about rectifying mistakes or defects; it is about ensuring that they simply do not happen. The Poka-Yoke entrance is promoted in the manufacturing industry as a way of improving productivity by reducing errors using often very simple modification. This research gives that, as Poka-Yoke are designed to make process mistake proof quality control.

This research provides a study demonstrating the use of the Poka-Yoke approach in assembly of rotary cage fixture process highlighting how they served to improve to work by fulfilling Universal Design accessibility principal.

Poka-Yoke is required to implement for one side open block machining fixture is an important manufacturing activity, but there are very few hard and fast engineering principles involved in the fixture design process. Even the available limited analytical rules are not so flexible enough for the correct fixture design. Further, more, there is no exact definition as to what constitutes a good fixture design. A skilled tool designer learns his trade through apprenticeship training and many years of experience. With the current decline in the number of skilled machinists, tool and die workers, there is a clear need for an increase in the level of fixture automation. The present project describes Computer Aided Fixture Design system using the 3-2-1 Method for the design of a fixture to hold Cylinder Head components during processing on SPM. The fixturing modules, allows the user to model the component in terms of meaningful operation features and help in the selection of correct location points. The mechanical analysis of the component, which has been carried out in the project, will suggest the holding details.

Fig1.1-BUSH

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Fig. N0. 1.2- BUSH PRESS M/C

Fig. No.1.3- Bush Press Machine

1.2 Problem Statment

- At unfortunately or due to improper working of worker the problems detected.
- One side bush of lower link arm circular broadcast is lifted blank by worker
- It causes that problems occur in future working of that part.
- It consumes lot of energy of worker for lifting the job and revolve it for other side bush fitting.
- It takes time for working.
- Cause of improper working of sensors .the worker lost his figure into the hydraulic arm.

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- If any problem's done with hydraulic system then cause of excessive pressure the link fitting side is getting displaced about its position.

1.3 Secondary Objectives

1. To increase the productivity of the machine.
2. To reduce the operating time.
3. To increase safety of the worker.
4. To increase the accuracy of the worker.
5. To increase the production rate of the specified product for maximizing the profit of company.
6. To reduce the handling time of worker for specified product.

1.4 Scope

1. This project will helps to reduce the problems creating while working on machine
2. It helps to keep safe operation of the worker while working.
3. It helps to increase the productivity of the machine.
4. It will helps keep in safe side to making more cars & reduce the waiting of peoples for getting car.
5. It helps to maximize the profit of the company with respet ro order completion.

1.5 Methodology

- Our methodology of project is

1. Existing condition
2. Possible solution
3. Analysis

3.1 Take all dimensions of working space.

3.2 Simulate it into modeling software.

3.3 Model it into modeling software.

4. Implementation
5. Result

1.6 Existing condition

- Lower link of the xylo &Scorpio four wheeler SUV. Have cast iron rubber bushes are fitted on the hydraulic type of bush press.
- One by one total two bushes are fitted on lower link.
- Which required maximum 2.00 minute to complete pressing that two bushes on lower link
- Only single worker works on the bush press machine.
- The production of one shift's near about 360-400 jobs in one shift means they are trying to do as more as possible
- Hence difficulty is to lift the job by manually after pressing first bush in lower link and rotate it for second bush fitting.
- The process on machine as safe as for future production process

- Here we seen that by default or by mistake any one circular broadcast left blank .
- Cause of this future production will gets in trouble.

1.7 Possible Solution

1. Double bush press machine.
2. Implementation of small type of fixture or system by which we are trying to solve the problems.
3. We can modify the work table
4. Single bush press machine with two hydraulic arms mounted on it.

1.8 Analysis

- When we are gone for the solve the problems then we analyses the working time of completing one lower link bush press fitting
- The time taken for completing one job is near about 2.00 minute
- Actually we have to make fixture that reduces the time for completing full action on one job.
- The fixture that save the loss of energy for handling one job.
- The centralize system which helps to revolve the job in 360 degree about its mean position.
- For this we calculating all time taken by that system, all the dimensions on which we have to work.
- We took all the dimensions with respect to all peripherals of machines.
- We are doing a simulation on the modeling software for doing original model.

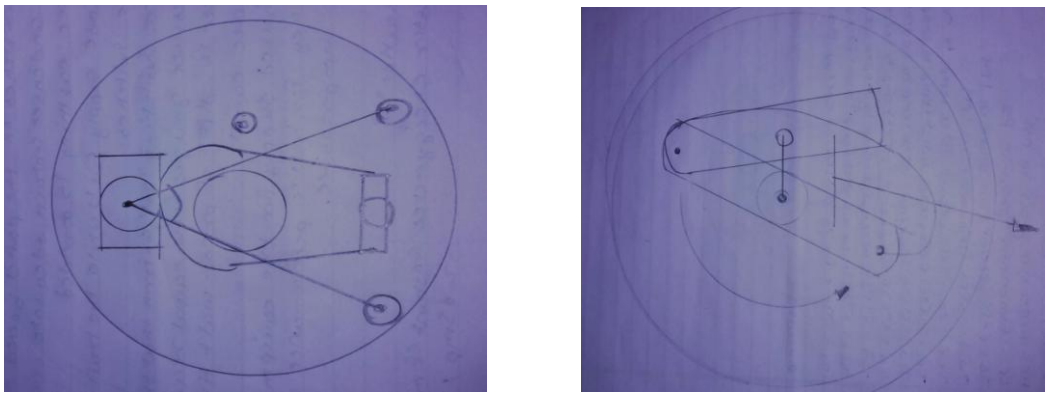

Fig.1.4- Drawing for simulation for modeling consideration

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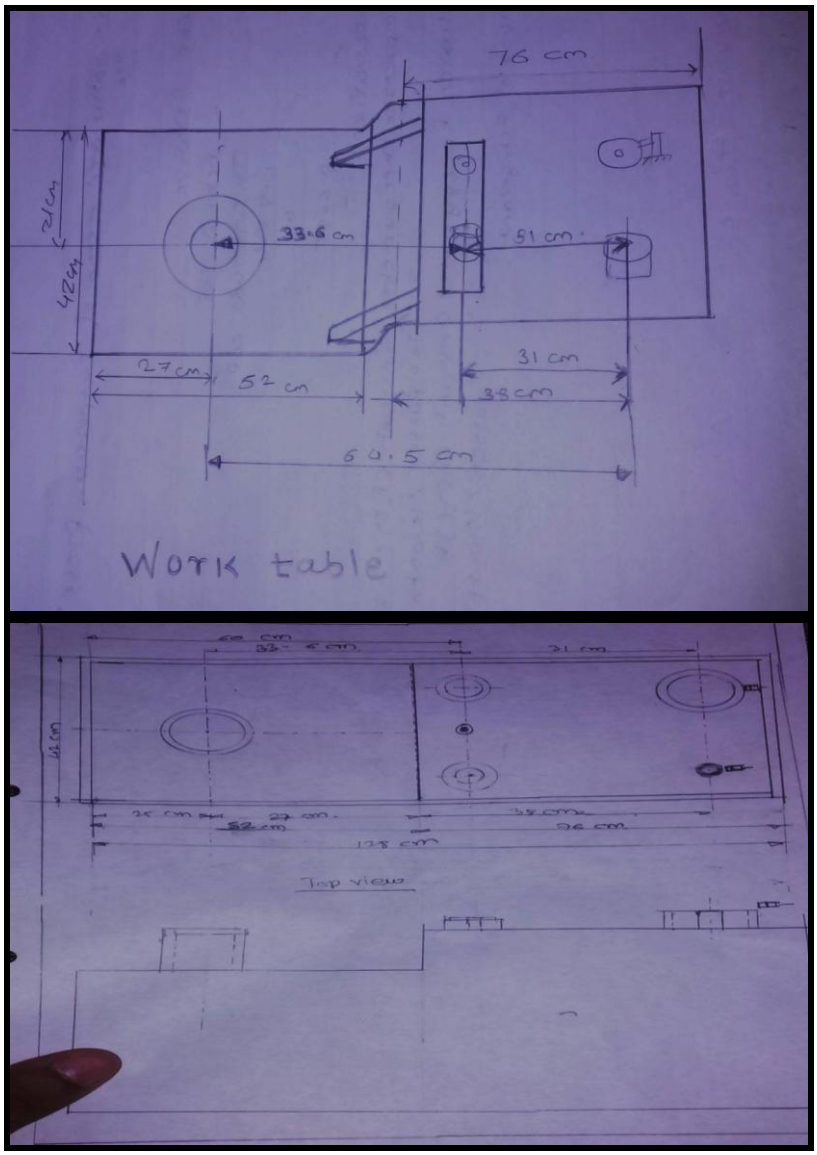

Fig.1.5-Work table dimensions

II. LITERATURE REVIEW

Reference data were used for the new design for modification of a new holding structure. With regard to design specification, stress distribution, deflection, optimization, ergonomics, stiffness and rigidity was focused on recent design and development in press frame obtained from structural components of press machine frame.

2.1 Design of Bush Pressing Machine

Following are the figures of frame & bush. The tolerances provided for hole in the frame & bush outer diameter are studied in detail.

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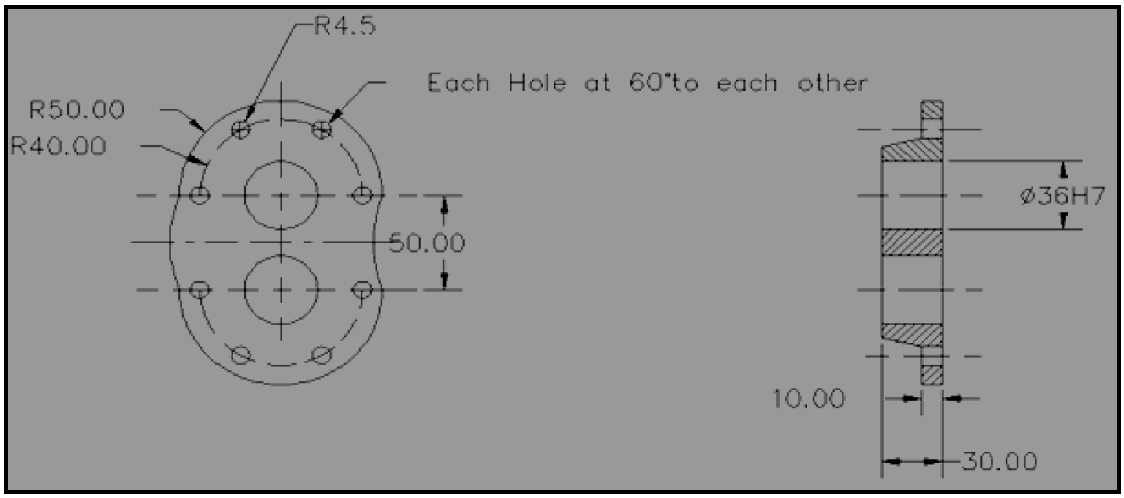

Fig. 2.1 Details Of Frame

The material of the frame shown in the above figure is Cast iron. Bush is to be fitted in the hole of diameter 36 mm. Only important dimensions & tolerances are shown in the figure to reduce the complications.

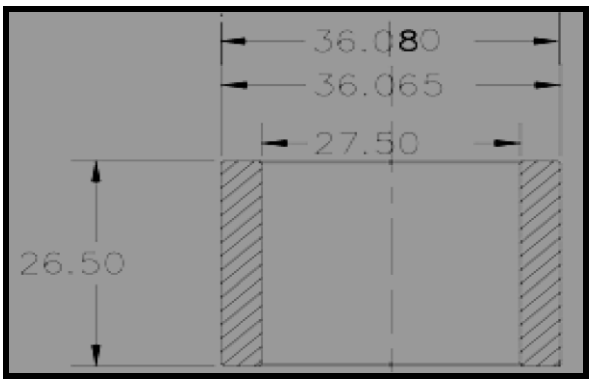

Fig.2.2 Details of Bush

The material of the bush used is Phosphor Bronze. Here also only important dimensions with tolerances are shown. The diameter of the bush is larger than 36 mm ensign of Press Body/Frame**.** The permissible tensile stress for the selected „C" plates is given by

σt =Yield Stress= 121.6 N/mm2

Factor of Safety=3042.5

For design of the bush pressing machine, the maximum interference between bush & hole in pump frame after nitrogen cooling of bushes is determined. But the machine is designed for maximum interference which can be obtained by normal press fitting operation for the present diameter of bush. This interference is slightly higher than the one which is obtained due to nitrogen cooling of bushes. The force required for this operation is 17.78 KN.

Since two identical plates (C shaped) are taken, the force on each plate is (17.78/2) = 8.89 KN.

These C" plates are subjected to direct tensile stress & bending stresses. The stresses are maximum at the inner fiber.

At the inner fiber,

σt =□□x

Mb xI

σt = Permissible tensile stress

P = Force acting

A = Resisting area of C plate = Width of C plate x Thickness of C plate

Mb = Bending moment

y = Distance of neutral fiber from the point of application of force

I = Moment of inertia of resisting cross sectional area of plate

Let us take, Width of „C" plate = 150 mm

Hence,

121.6 =8890150 □□x8890 □ 150+75 □ 75112□□□ 1503

t = 4.87 mm

Let us take a standard 6 mm thick plate for C plates of the body.

Considering the height of the normal person, the space required for mounting the casting frame & bushes, & the free space for the hand movements, mounting of hydraulic cylinder etc. other dimensions of the C plate are finalized and areas shown below in the figure.

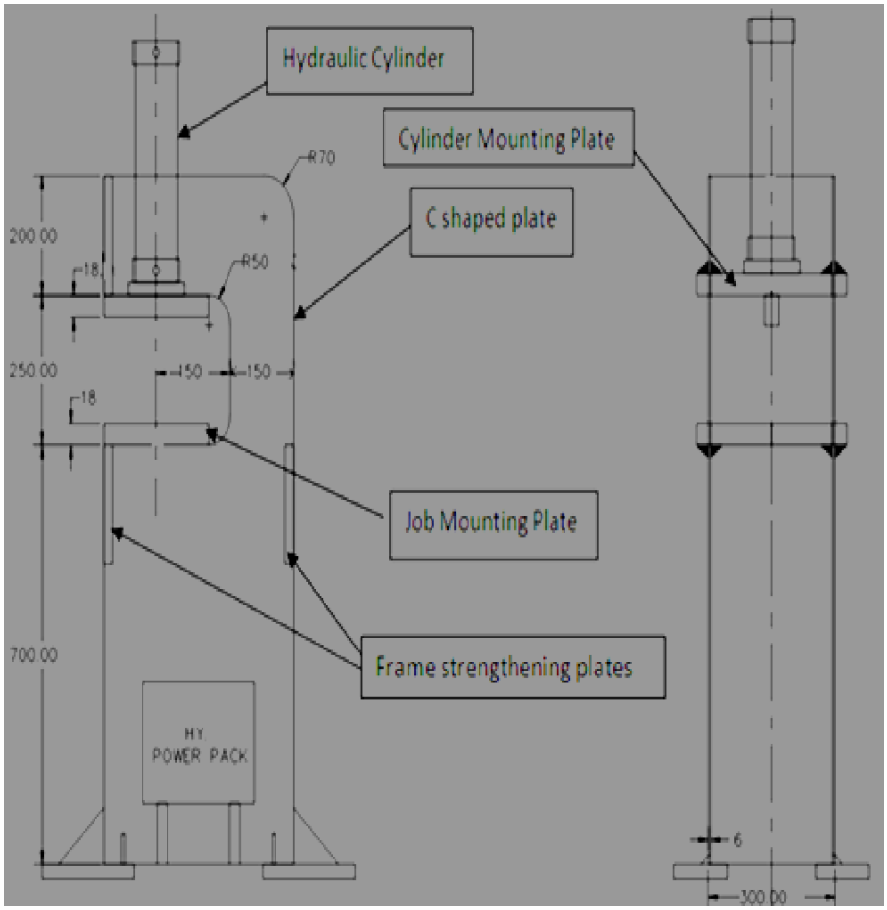

Fig. 2.3 Layout Bush Pressing Machine

The above figure shows details of the different parts of the complete machine.

Using,

σt =□□□□□

For simply supported beam,

Max. Bending Moment = Mb = (Force x Length)/ 4

= (17780 x 300)/4 = 1333.5 KN-mm121.6

t = 16.22 mm = 18 mm (Say)

Now the dimensions of the job mounting plate are 250 mm x 300 mm x 18 mm

The calculations done for job mounting plate are also applicable to hydraulic cylinder mounting plate. This plate will have same dimensions as job mounting plate. Frame strengthening plates Four plates are used for keeping two „C" plates together & strengthening the body of the machine. The dimensions of these plates are 300 mm (width) x 200 mm (height) x 10 mm (thickness). Two plates are mounted in the front side, one at the top side & one at the bottom side. One plate is mounted at the back side of the machine. Leveling and installation plates are provided at the four corners of the base.

III. CONCLUSION

The manufacturing of fixture will reduce the human effort of loading and unloading the work piece on the machine. The new designed fixture will help to reduce the working time on machine for one job, also it reduces unnecessary skill labour requirement. The cost of new fixture is low. The rate of production using new fixture is high compare to existing production rate.

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