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DESIGN AND FABRICATION OF HYDRAULICALY OPERATED SPECIMEN MOUNTING PRESS Ananta Mahale¹, Madhuri Pethkar², Ankita Kulkarni³, Gaurav Galphade⁴,

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ABSTRACT

The aim of this paper is to orchestrate the mechanical system with hydraulic system to facilitate the ease of operation to manufacture the smaller part in a mass production. In the present condition, time constraint in crucial part for completion of any production process. Thus with the use of atomization, the production time can be reduced as well as higher degree of accuracy can be achieved as the human effort will be mitigate thus an attempt has been made to provide the smooth and rapid functioning of the press work with the help of hydraulic system.

Keyword:-knowledge management, press work, hydraulic press, heater

1. INTRODUCTION

Hydraulic press is tool to produce compressive force by means of liquid (fluid) it depends upon the Pascal's principle that the pressure throughout an enclosed chamber is constant. By means of hydraulic system larger forces can be produced in comparison with mechanical and electrical systems. Such forces can be used for the press work application such as blanking, punching, piercing, coining, trimming etc. Press work is a method of multiple productions involving the cold and hot working of metals, usually in the form of thin sheet or strip. Press working is one of the usually employed methods of fabricating parts of complicated 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 involve heating of the components, close tolerances and high surface finish can be obtained on the component. Since presses can produce components at fairly fast rates and at low time and unit cost of labor for operating the press is fairly low.

Press working forces are set up, supervised and controlled in a machine referred to as a Press. Thus an attempt has been made to regulate the process of press work using Hydraulic mechanism in press machine. The inputs and outputs of the control system including hydraulic mechanism are merely mechanical such as rotating shaft or reciprocating plunger. The prime enumeration of accounting this system is the movement of the mechanical devices can be operated by means of hydraulic components such as actuators to initiate the movement which could be in the form of lever to apply manually or by means of switches to operate automatically. Furthermore, direction control valves have been used to control the directions of piston movements and regulate the rate. Thus the whole mechanisms have been simplified with the use of hydraulic equipments. Moreover, the use of pressure control valve and direction control valves makes it easier to regulate the forces and control the speed of the setup.

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2 LITERATURE REVIEW

2.1 Johan Gensfleisch

The press machine Gutenberg a German invented in 1400 was modified one from a wooden screw type press machine for squeezing olive oil and grapes. This was exactly the root of the screw presses and all press (punching, stamping) machines, stamping inked print boards onto sheet with the screw. This is the type of Machine to apply static pressure.

2.2doc Smith & Mates

In 1999 work on hydraulic press machine & give conclusion that the press work on the Hydraulic version of the press machine.

2.3isaac Bamgboye And Morakinyo T.A

An improved oil screw press has been designed and constructed having 98.6 % efficiency and a capacity of 0.86 tons/ day. Abrasion rate of screw-shafts has been reduced from 63.3% to 12.6% by using high carbon steel material instead of low-carbon steel.

2.4 Peter Beerens

In 2007 gives an idea about press machine and the result is extended due to improvement in the plate form in the design of the machine.

3 PROBLEM DEFINITIONS

1) Without mounting there are various problems to handle specimen.

- 2) Unavailability of mounting press at low cost.
- 3) Varying sizes of specimen to be tested.

4 OBJECTIVES

- 1. To provide easily mounting of specimen in testing of metal.
- 2. To make this machine which operate manually for small mountings?
- 3. To provide this machine at lowest cost.
- 4. To provide higher surface finish of the specimen.

5 METHADOLOGY

The steps in the design process proposed As follows:

- 1. Problem identification
- 2. Preliminary ideas
- 3. Problem refinement
- 4. Analysis
- 5. Decision, and
- 6. Implementation

5.1 Problem Identification

It needs to gather data of several types: fixed data, opinion surveys, experimental data, and personal observations.

5.2 Preliminary Ideas

It is the generation of as many ideas as possible. These ideas should be sufficiently broad to revolutionize existing methods. All thoughts should be recorded in written form with diagrams. A technical approach should be used to collect preliminary ideas for the design problem. The following sequence of the step is suggested:

- i. Hold brainstorming session,
- ii. Prepare sketches and notes,

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iii. Researches existing designs, and

iv. Conduct surveys.

5.3 Design Refinement

Several of the preliminary ideas are selected for further refinement to determine their true merits. Consideration is given to spatial relationships, angles between planes lengths of structural members, intersections of the surfaces and planes. Analysis In involves the development of the best design to determine the required merits of each part of the machine with respect to price, cost, and strength function and market appeal. The analysis is done in all respect, that is, Functional analysis, human engineering, market and product and model analysis.

5.4 Decision

Decision of any design is taken after the different type of the analysis done with the design and its matching with the requirement in the industries. It is the final stage of the administration group before implementation of any design in the factory. So, it is the crucial stage of the administration how and up to which extant the design is to be implementing for the improvement.

5.5 Implementation

It is the presentation of the final design concept in a workable form, primarily as working drawings and specifications that are used as the actual for fabrication of a product.

6 WORKING

The specimen, to be tested, is placed on the movable die of press. Which is surrounded by hollow pipe and Bakelite powder is inserted inside the hollow pipe. Bakelite powder is inserted on full length of pipe which is approximately 4 cm. The heater is placed outside the hollow pipe close to the surface of cylindrical pipe.

Now the hydraulic jack is used to compress the Bakelite powder with movable die pushing upwards. The powder get compress by this force .when die reaches to its uppermost position heater is switch on.

When the heater gets to 120- 150 degree Celsius heater is switch off .by releasing the pressure of jack movable die with the help of compression spring lowered down? Heater is removed from pipe and with the help of tongue hollow pipe is removed from the die.



Fig; specimen mounting press

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Now to remove specimen from the pipe. The arrangement is done on press. A plunger is fitted on fixed die to remove specimen from pipe.

7 COMPONENTS

7.1 Support Structure

It is an assembly of support frame and bed. Both the channels bolster each other with the help of a supportive plate welded at the top of the structure. Further it is welded at the foundation to give the whole assembly a framed structure.

7.2 Upper And Lower Plate

The two are used in this press, which is the upper plate and lower plate. The upper plate is fixed to support structure and the lower plate is movable on which specimens are mounted inside the heater.

7.3 Heater

In the specimen mounting press the electrical mold heater is used for heating the Bakelite powder.

7.4 Spring

In this the helical compression spring is used on the shaft which is supported to upper and lower plate.

7.5 Hydraulic Jack

The hydraulic jack is used to compress the powder which is place inside the heater.

8 ADVANTAGES

- Built in Overload protection There is no danger of overload
- Much lower original cost and operating cost
- It is easier and less expensive to buy.
- More Control flexibility
- Greater versatility
- Less Noise while operating
- More Compact
- Safety in operation

9 DISADVANTAGES

- Hydraulic specimen mounting presses require some external power to feed stock
- In this press does not contain an antis hock feature, this shock can affect the lines and fittings.

10 RESULTS AND DISCUSSION

In earlier mounting press holes are created in Bakelite powder due to lower compression and irregular heating and due to that strength of Bakelite powder get affected and breakdown of specimen occurs. Time required for earlier machine is much more.

After applying this mechanism on hydraulic press surface finish of specimen is maintain and time required is considerably reduced.

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11 CONCLUSIONS

From the trial taken of fabricated mechanism we come to conclusion that the hydraulic operated press works effectively on previous drawback and with using this machine quality of surface finish can be improved with reduction in time. This machine we have fabricated is available at very affordable cost.

Moreover it works on following factors

1) Productivity of mounting is increases.

2) Problem of strength is solved by the mechanism.

3) Empty space produced due to uneven compression is minimizing by the mechanism.

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