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DESIGN AND DEVELOPMENT OF AUTOMATIC PRESS FOR 65FLANGE COMPONENT

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ABSTRACT

The aim of this paper is to integrate the mechanical system of hydraulic press with the power pack, fixture plate and PLC to facilitate the ease of operation to press bush into the component. In the present scenario, time constrain is a crucial part for completion of any production process. Thus with the help of atomisation, the production time can be reduced and the accuracy can be achieved as the human efforts will be reduced. Thus endeavour is made to provide the fast and easy functioning of press work with the help of hydraulic system.

Keywords: Press Work, Hydraulic Press, Automation, Power Pack, Fixture Plate, PLC.

I. INTRODUCTION

Hydraulic press is a tool to produce compressive force by means of fluid. It depends upon Pascal's principle that the pressure throughout an enclosed entity is constant. By means of hydraulic system larger forces can be produced in contrast with mechanical and electrical systems. Such forces can be used for the press work application such as blanking; punching, piercing, coining etc.

Press work is a method of mass production involving the cold working of metals, usually in the form of thin sheet or strips of various shapes like circular, cylindrical etc.[2] Press working processes make use of large forces by press tools for short time interval which results in cutting or inserting the material into components[6]. Since, press working does not involve heating of the parts, close tolerances and high surface finish can be obtained on the part. Since presses can produce components at fairly fast rates, the unit cost of labor for operating the press is fairly low.

The manually pressing is done for various objects in conventional press machines which consume time, money and labour cost [5]. Thus an attempt has been made to automize the process of press work by adding motor driven power pack which is able to generate the pressure required for pressing the bush into the component. The prime requirement of implementing 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 switches to operate automatically. Direction control valve have been implemented to control the forward direction of piston movement. The PLC is interfaced to the system.

II. NEED OF PROPOSED SYSTEM

In the current system the bush pressing is done manually. So it takes large time for the press of two bushes in different hole of the component. Also there is no provision made so that the piston and hole in which bush is

going to be pressed are concentric so there is problem of wrong fitting of bush [4]. To avoid these problems we developed the power pack so that with pressing button the piston will get acetated and press the bush in one stroke. We also designed and developed the fixture plate on where the component can rest and the provision was made that the piston and hole were concentric to each other. So the time for the completion of the bush pressing has reduced on large extent. Also the fixture plate which is implemented in the frame has eliminated the problem of fixing the component concentric with the piston in the system.

III. COMPONENTS OF AUTOMATIC PRESS

3.1 Power pack:

Fig no. 1

A **hydraulic power pack** is a system comprising an interconnected set of discrete components that transport liquid. The purpose of this system is to compress the fluid, hydraulic fluid is pushed under pressure, through pipes, tubes, hoses, hydraulic motors which is coupled to the pump, generate pressurized fluid which is forced in to the hydraulic cylinders, thus it gets actuated and presses the bush into the flange. The components of power pack are motor, pump, bell house coupling which is used to couple motor and pump, filter (suction),pressure gauge which is placed on the power pack, direction control valve (solenoid valve) and all these are mounted on the tank.

3.2 Frame:

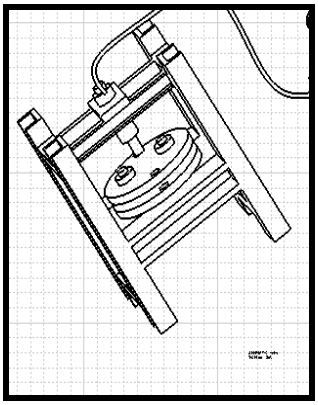

Fig no. 2

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 [3]. Further it is welded at the foundation to give the whole assembly a framed structure. The bed which holds the fixture plate which we have designed is clamped on the holes on the left and right side of the frame.

3.3 Fixture Plate

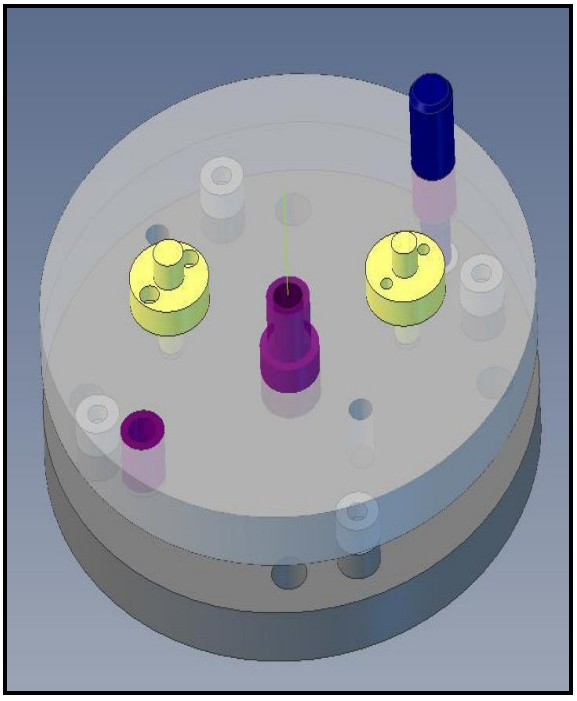

Fig no. 3

The fixture plate is designed according to the 65 flange component and the rear body component.so that the both the component can rest on the plate easily and the bush pressing is done. The fixture plate is circular in shape and it consist of two plates one is base plate and other is the resting plate on which the component lie. The resting plate can rotate freely in circular motion. The fixture plate consist of two circular plates, dowel pins, locking pin, resting pads, bush, pin locater.

3.4 PLC and Sensors

To make system sophisticated and automatic PLC (programmable logic controller) and sensors are inserted into the system. So the system will be a mechatronic system working automatically. The sensors used are the inductive proximity sensors for sensing of the components and the limit switch for the 180º movement of the fixture plate.

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IV. ACTUAL SETUP

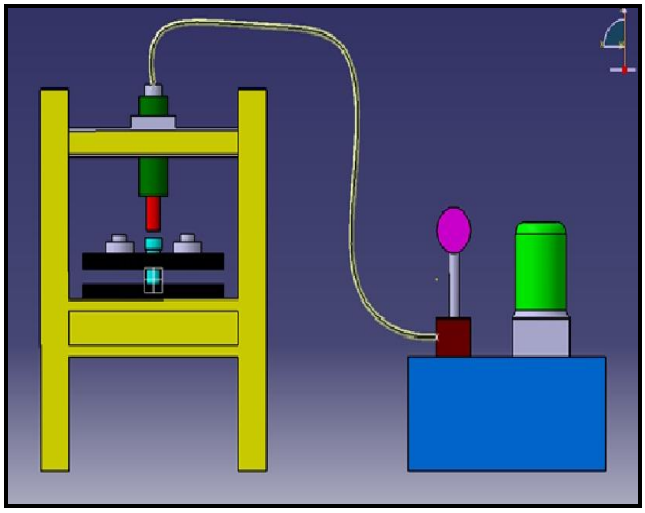

Fig no. 4

V. THE HYDRAULIC CIRCUIT FOR THE SYSTEM

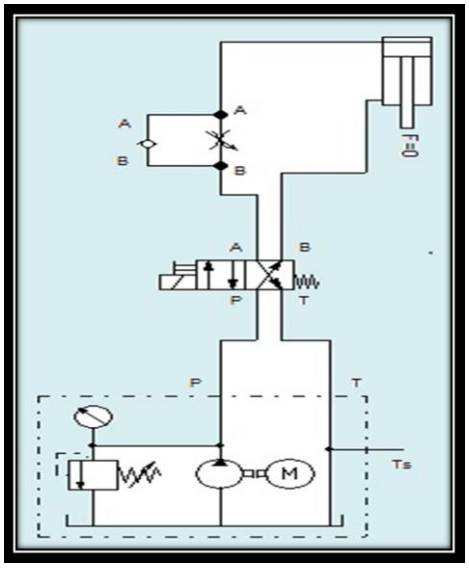

Fig no. 5

The above circuit diagram represent the operation sequence of the designed automatic hydraulic press. As one can ohserve from the diagram that the movement of the cylinder is being regulated by means of solenoid operated spring return direction control valve.

VI. ADVANTAGES AND LIMITATIONS

6.1] The time required for the complition of the cycle (i.e fitting 2 bush) has reduced from 124 seconds to just 44 seconds.

6.2] Due the fixture plate the every time ajustment (concentric) of the component (hole) and the piston is eliminated.

6.3] Due to fixture plate positioning the rejetionof the job due to the wrong inserting of the bush is reduded.

6.4] The manually fitting of the bush with the help of lever is eliminated.

6.5] The fixture is rorated manually for 180º rotation.

VII. RESULT

First when the bush were pressed manually,

Total no. of jobs = 400 pre week

Rejection = 35 per week

Now when the bush is pressed automatically

Total no. of jobs = 400 per week

Rejection = 3 per week

Total Time required for pressing the bush manually.

Total no. of jobs = 400 per week

Time required = 14 Hrs per week(approx.)

Total Time required for pressing the bush automatically,

Total no. of jobs = 400 per week

Time requied = 5 Hrs(approx.)

VIII. CONCLUSION

Thus the automatic press was developed due to which the manually operated system was eliminated. The time required for the complition of the cycle was reduced the rejetion of the jobs due to the wrong fitting of the bush was reduced.

REFERANCE

[1]. “Hydraulic Presses” doc Smith & Associate, 530 Hollywood Drive, Monroe, Michigan, (pgs.: 1-20)

[2]. J.SenthilKumar, A.Praveen, Paspuleti Naga Divya Swarup “design and load analysis of pneumatic press machine for automobile wheel hub assembly” international conference on recent advancement in mechanical engineering &technology (ICRAMET’ 15) Journal of Chemical and Pharmaceutical Sciences, April 2015(ISSN: 0974-2115), (pgs.: 321-324)

[3]. Rucha k. Khisti, Manoj M Budhi, Mandarpadman. “Design and Analysis of C Frame for Hydraulic Press.” International Journal on Recent Technologies in Mechanical Electrical Engineering (IJRMEE) ISSN: 2349-7947, Volume: 2 Issue: 5 (pgs.: 59- 62)

[4]. Chetan.P.Sable, P.D.Kamble, Dhiraj D. Dube "review on paper plate making machines" international journal of research in aeronautical and mechanical engineering. ISSN (ONLINE): 2321-3051.Vol.1 Issue.8, December 2013. (Pgs: 61-66)

[5]. Ankit H Parmar, Kinnarraj P Zala, Ankit R Patel. "Design and Modification of Foremost Element of

[6]. Hydraulic Press Machine" (ISSN 2249-9954) Issue 4 volume 3, May-June 2014 (pgs.: 658-667)

[7]. 6] Andrew A parr, Hydraulics and pneumatics. Elsevier science and technology books, ISBN: 0750644192 March 1999.