Design And Fabrication of Pneumatic Bar Bending Machine

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Abstract- *The main objective of this work is to implement the Pneumatic rod bending machine in the construction sites with less cost compared to the existing bending machines, and increasing the productivity of the stirrups. The bending machine is one of the most important machine tool in sheet metal work shop. It is primarily designed for bending. The bend has been made with the help of punch which exerts large force on the work clamped on the die. The bending machine is designed in such a way that, it works automatically. The automation strategy, when implemented is believed to result in reduced cycle time, costs and improved product quality. Other possible advantages are repeatability, increased productivity, reduced labor and integration of business systems.*

Keywords- Bending Operation, Pneumatic Component, Pneumatic System

I. INTRODUCTION

Since long time ago the labour work has essential role in constructions including mixing coarse aggregate-sand-water- cement, ramming sand, land levelling, and digging the foundation for base of structure, cutting rod in required length, rod bending and pouring the mixture of concrete in columns and beams. Now days, due to development in technology it is required to reduce the labour work and time since there are lot of available resources. As population increasing very rapidly, demand of the construction to build the buildings for industries, overhead bridges, human livings and population is continuously increases. Several problems come in to the picture when we consider human work with respect to automation. By using conventional method, it is not possible to reduce construction time and building it as early as possible. So, Automation in construction system is requires. The paper is designed based on the principles of pneumatics and the system is automatic type. By using automation, the productivity of the product can be increase.

In industries the automatic sheet bending and sheet shearing are widely used. Earlier the process was carried out manually. The manual process was time consuming as well as the output of machine was very less. The main aim of the project is to improve the efficiency of the required output and to increase the production with quality output. In this project we used pneumatic system, „Pneumatics", from the Greek (pneumatikos, coming from the wind) is the use of pressurized gases to do work in science and technology.

Pneumatic devices are used in many industrial applications. Generally appropriate for applications involving less force than hydraulic applications, and typically less expensive than electric applications, most pneumatic devices are designed to use clean dry air as an energy source. The actuator then converts that compressed air into mechanical motion. The type of motion produced depends on the design of the actuator. Pneumatics is employed in a variety of settings. In dentistry applications, pneumatic drills are lighter, faster and simpler than an electric drill of the same power rating, because the prime mover, the compressor, is separate from the drill and pumped air is capable of rotating the drill bit at extremely high rpm. Pneumatic transfer systems are employed in many industries to move powders and pellets.

II. OBJECTIVES

This project is developed to study about the automation in process of bar bending machine industries. Mainlypreferable for small industries. The purpose of this project is listed below:

1. To increase the accuracy of product.
2. To reduce the time consumption.
3. Less machine setup time is required.
4. To produce curve and curvature shaped bend pipe.
5. Pipe should be bent in 90 degree.

III. METHODOLOGY

Project deals with the semi-automatic bending of rod.

1. The hardware consists of pneumatic cylinder constructed with steel, pressure guage, and rod.
2. A rod which is to be bent is taken. The length of the rod is
3. As our project is semi-automatic, human interference is needed.

4. The rod is placed on the pneumatic cylinder machine.
5. Pressure is set in the pressure gauge .The pressure can be
6. The pressure gauge is operated by human.
7. When the rod is placed, the point where it should be bent is marked on it.
8. With the help of pressure gauge, the force is applied on the rod for bending.
9. When the pressure is applied, the piston pushes the rod to the front side of the machine.
10. Due to the pressure applied, the rod is bent per the human need.
11. This is a semi-automatic project so both human and machine interference is needed.

IV. ADVANTAGES

In this paper the wiring is very much complicated, if any troubleshoot occurs then the fault cannot be easily found, for this the interface with the PLC can be used, by which the wiring is minimized and the fault can be easily detected without waste of time.

- Fault can be detected.
- High durability and reliability.
- Simple design.
- High adaptability to harsh environment.
- Pneumatic systems are safer than electromotive systems.
- Environmental friendly.
- Economical low cost.

V. LITERATURE SURVEY

C. Anbumeenakshi, M.R.Thansekhar, et.al,(2018)Nowadays for construction works bending of rods is necessary for constructing the pillars. Bending of such rods is done manually by setting angle plates. This wastes lot of labour (man) power and time. It is proposed to replace the manual work and reduce time taken for bending by designing an alternative machine to replace the manual work which works by the principle of hydraulic system and indexing mechanism. This will reduce the time taken for bending operation and more than one rod can be bent at a same time. Bending can be done with required dimensions and accuracy is maintained during the entire operation. By changing the dimensions of the die required bents are made on the rods. Along with the ease of operation use of hydraulics also makes it more precise, economical and compact. The entire machine is easily portable and having nice aesthetics as well. Keywords: hydraulic system, indexing mechanism, bending operation.

ChetakrajChavan,arjunDhamale,.al.,(2018) The objective of the subject is to make new design of manually and hydraulically operated pipe bending machine and stress acting on pipe after bending of pipe. The pipe bending machine is use to bend pipe in different angle shape and curvature as requirement of work. The machine is useful to bend different thickness pipe as per the requirement of shop. The machine is fully portable type and less weight and easy to assemble and disassemble. The can operate unskilled operator. Our main objective is useless parts for manufacturing pipe bending machine. And analysis different stress act on pipe using ANSYS Workbench.

Pneumatic cylinder:

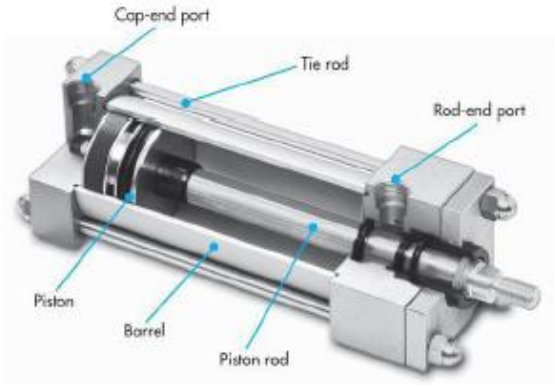

Fig 1: Pneumatic cylinder

Pneumatic cylinder(s) (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved.

Fig 2: Solenoid valve

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid. In the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid

valves can be placed together on a manifold. Solenoid valves are the most frequently used control elements in fluidics.

Fig 3: Air compressor

An air compressor is a device that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (i.e., compressed air). By one of several methods, an air compressor forces more and more air into a storage tank, increasing the pressure.

Project Working:

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VI. CONCLUSIONS

Since testing the stirrup making machine it is observed that how much time is required to make single piece of stirrup by effective working.

- In latest attempt a successful solution for the manual stirrup making is obtained.
- By using various fixtures in the table we can able achieve different shapes and sizes of the stirrups.
- The system can be handled by any operator very easily.
- Since it is cheap and simple design this machine can be sell to anywhere across the nation.
- Advance bar bending machine use for mass production. By using advance bar bending machine increases production rate and reduce labour cost.

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