



TMT Bar Bending Machine

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Abstract: The aim of this project is to usage of bending machine to bending rods for stirrups which are used to withstand loads in beam and columns. Stirrups both end bend with 90 degrees right angle. The main objective of our project is to implement the hydraulic rod bending machine in the construction sites with less cost compared to the existing bending machines, and increasing the productivity of the stirrups. The design of the automatic metal stripping and bending machine will utilize subsystems which together compose the machine.

Keywords: Bending Machine, TMT Bar

I. INTRODUCTION

The world is focusing into automation. Each and every work of human is reduced by a machine. Automation of a manufacturing process plays a vital role in reducing a company's production costs. The primary reasons for automating a manufacturing process are reducing labor costs, reducing waste, improving quality, increasing repeatability, reducing employee injuries, and allowing uninterrupted production. The project involving automation of stripping and bending the rod and stirrups is proposed. A current market need for such a machine exists in the stirrups bending, as can be seen from the multi-rod cutting and bending machine manufactured by lot of industries.

This project is to bend the rod at the specified dimensions which is used in the building construction which called as Stirrups. Stirrup is an important reinforced element which acts as a shear reinforcement. Presently, stirrups are made manually, which suffers from many drawbacks like lack of accuracy, low productivity and resulting into severe fatigue in the operator. So we need to bend stirrups perfect accuracy with a huge production. Bending machine presented in this report is to produce construction rod with both ends bent at 90 degree. This rod lengths varying from 36 inches, and the stirrups diameter is 6 to 10mm. The production rate of this machine is 100 rod per hours. The automation of this process serves to replace the manual human operations previously used to hand manual stirrups bending.

Now-a-days in industries especially in automobile and other industries the automatic plate bending machines are widely used. Earlier the bending machines where operated manually. So the output of machine was very less. Now the technique of bending operation of the component is changed.

1.1 Objective of the Project:

- ❖ To understand the basic principal of the our project
- ❖ Describe the construction and working of various parts of our project
- ❖ Development of the working model of the our project
- ❖ To reduce time spent on this activity.
- ❖ To analyze the technology according to needs and capabilities.

1.2 Scope of the Project:

- ❖ A successful solution for the manual hand making stirrups.
- ❖ Machine can be handled by any operator very easily.
- ❖ In this system have a low cost and a design is simple so it can be used in any type of construction site.
- ❖ In this system bending of stirrup rod can extended to its length against workstation is possible.
- ❖ By changing the fixture in the table we can obtain various shapes and sizes of the stirrups.

**II. LITERATURE REVIEW**

Vala Bhargav, Unal Mohammada Amir, Tank Kishan and Prof. Nikunj Gevariya worked on design and analysis of bar-bending machine. Presently, stirrups are made manually, which suffers from many drawbacks like lack of accuracy, low productivity and resulting into severe fatigue in the operator. Bar-bending machine is a semi-automatic type of machine which utilizes less manpower. This reduction in manual work results increased output. The Principle advantages are less time consuming, production of identical stirrups, higher production rate than old traditional method. Our goal is to develop & design a machine to achieve high production rate with less man power & of desired accuracy.

Thokale Manoj, Kothwal Satish, Kotkar Rahul, More Suyog and Pawase Mahesh worked on bar bending machine there are few areas like construction, the usage of machines for bending rods for stirrups which are used to withstand loads in beams and columns are not done by machine. In this paper is aimed to do bending operation for stirrups using pneumatic and named as pneumatic rod bending machine 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.

R. Sasikala, M. Rakshana, T. Thinaa, P. Thirupponvel worked on bar bending machine using pneumatic system The main intention of this project is to automate the bar bending process using pneumatic system to reduce the cost and enhance the productivity. Conventional Methodologies involve major labour work, layout setup, high cost etc. Existing hydraulic system are cost high enough, so to make cost effective, Pneumatic bar bending system is proposed here. This paper discuss about the construction and process of pneumatic based bar bending system, also the associated practical implications during implementation.

Mr. Pratik K. Channe, Mr. Ajay S. Tiwari, and Mrs. Mrunal worked on Bar bending machine pneumatically operated 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. Automation is achieved with the help of Electro pneumatic system.

Muhammed, S. Ravivishwnath, P Sureshkumar , N. Sarvanan Design and fabrication of hydraulic rod bending machine, April 2014. Worked on design and fabrication of rod bending machine and they concluded that Each and every work of human is reduced by a machine, but few areas like construction the usage of machines for bending rods for stirrups which are used to withstand loads in beams and columns are not done by machine because the cost of machine is high and need skilled labours to operate it. So this project is aimed to do bending operation for stirrups using hydraulics and named as hydraulic rod bending machine. The main objective of our project is to implement the hydraulic rod bending machine in the construction sites with less cost compared to the existing bending machines, and increasing the productivity of the stirrups.

Vilas Shinde, Darshan Adhav, Suraj Jadhav, Afsar Attar, Sandip Gorde. Design and fabrication of hydraulic stirrup making machine, May 2016.They worked on Design and Fabrication of Hydraulic Stirrups Making Machine and they concluded that since testing the stirrup making machine it is observed that how much time is required to make single piece of stirrup by effective working.

The detail description is given as below: Loading and unloading combining clamping the bar to fixture it almost takes only 5 to 6 seconds. Time required to forward and backward stroke is about 10 to 11 seconds during which stirrup is made. Considering machine ergonomics that is interaction of human operator with machine, it is very easy to operate it because operating switch is provided at suitable place of machine. Again loading and unloading is not complicated since not very specialized tooling is used it is very simple structure.

The paper deals with manufacturing of pipes which use power operated sheet bending machine and manually operated sheet bending machine. It also includes limitations of manually operated bending machine. From the results of the paper the productivity of power operated bending machine is higher.



Author told in recent year's pipe bending machine is used in both industry and domestic purpose for bending the pipe under the required angles and dimensions. Sometimes Heat treatment is used for pipe bending but the heat treatment technique is not safe and have problems are produced in the pipes, such as wrinkling, curve forming, reduced thickness, whole forming, reduced strength, easy breakable. In the hydraulic pipe bending machine having an good advantage compared to heat treatment methods. In this paper, a bicycle integrated pipe bending mechanism has been designed and developed.

The applications of bent pipes are in frames, barricades, handle of bicycle. Most of industries uses bent pipes as air conditioning, boiler, power generation, ship building, furniture, railroad, automotive, off-road and farm equipment, aircraft etc. Due to adequate human power in countries like India, the human powered machine will result in improvement of the economy and employment of nation. In Asian countries people are facing electricity cut-off during most of the days so such system plays an important role in rural areas.

Hydraulic equipment has wide use in various automobile fields. These hydraulic instruments are used for lowering and raising chair in Barber shops and in dental clinics. Hydraulic bending machine is the suitable equipment to bend pipes, rods and bars. The pipe or rod to be bending is kept between the rollers. With use of hydraulic jack we implement force on the pipe and bend it to the required angle depending on the dies used. Hydraulic bending machine is less expensive, flexible and portable compared to those which are discussed earlier. Hence it is better to replace current standard machines by hydraulic pipe bending machine.

The aim of this paper is to develop a pipe bending machine which is useful to bend a pipe in workshop. This project is to design and construct a portable pipe bending machine. This machine is used to bend steel pipes into curve and the other curvature shapes. The size of machine is very convenient for portable work. It is fully made by steel.

Moreover it is easy to be carry and use at any time and any place. It decreases human effort and requires low skill labors for operating the machine. In this paper they designed manually operated pipe bending machine with use of gears, motors, pulley, and frame. This bending machine is both manually and power operated.

Metal forming is a process in which the desired shape and size are obtained through plastic deformation of a material without any loss of material. Bending is a metal forming process in which straight length is transformed into a curved length. Roller forming process is a continuous bending operation in which a long strip of metal is passed through typical roller adjustments, until the desired curvature shape is obtained. The bending changes according to material and according to the loading condition and thickness of sheet.

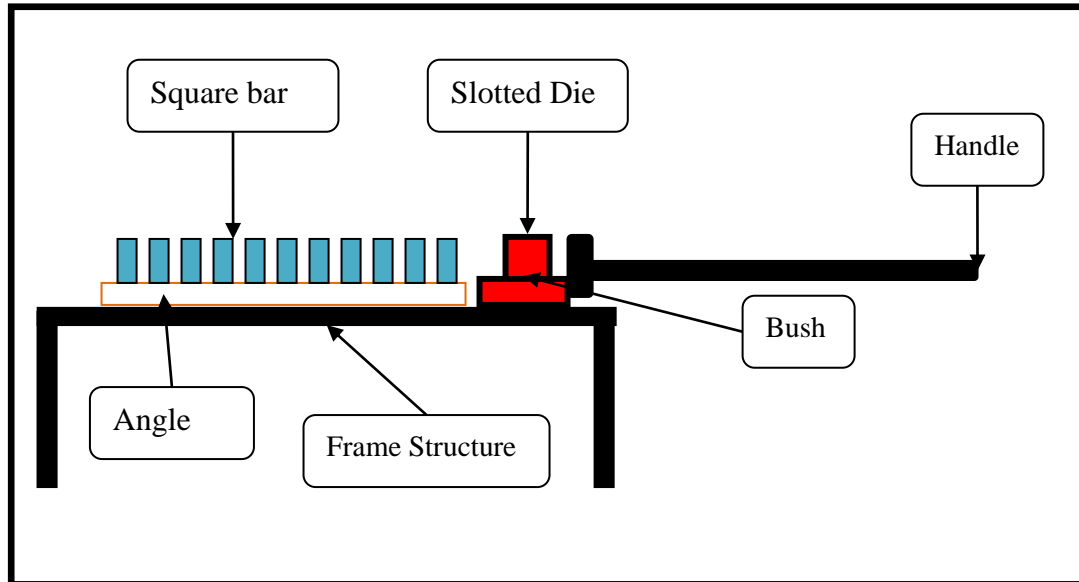
Yang et al, The positive impact plate, a pneumatic holder, a pneumatic element, a piston rod, a guide device, a die device And a lower fixed plate. The cylinder is fixed on the upper fixed plate; the gas holder is formed on one side of the cylinder; the pneumatic element is installed on one side of the cylinder; an electric control cabinet is on one side of The upper end of the piston rod is connected with the cylinder of the upper fixed plate; the lower end of the piston rod is connected with the sliding template; the guide device is followed connected with the upper fixed plate and the Lower fixed plate through the sliding template; a highest contact and a lowest contact are arranged on one side of the guide device; the die is installed on the lower fixed plate; a photoelectric sensor is installed on one side of the manual switch is based on one side of a punching machine.

III. DEVELOPMENT OF THE PROJECT

3.1 Parts used in the Project

- ❖ Slotted Die
- ❖ Bush
- ❖ MS Plate
- ❖ Angle
- ❖ Square bar
- ❖ Spring

3.2 Diagram of the Project



3.3 Working of the Project:

When the rod is placed, the point where it should be bent is marked on it. With the help hand, the force is applied on handle due to the rod for bending. When the pressure is applied, the handle pushes the rod to the front side of the machine. Due to the pressure applied, the rod is bent

IV. ADVANTAGES, DISADVANTAGES AND APPLICATION OF THE PROJECT

4.1. Advantages of the Project:

Advantages of the project as per following like as:

- ❖ Machine can be handled by any operator very easily.
- ❖ In this system have a low cost and a design is simple so it can be used in any type of construction site.
- ❖ In this system bending of stirrup rod can extended to its length against workstation is possible.
- ❖ By changing the fixture in the table we can obtain various shapes and sizes of the stirrups.
- ❖ A successful solution for the manual hand making stirrups.
- ❖ Increase the production rate.
- ❖ Machine cost is less compare to existing bending machines.
- ❖ In future we try to bend TMT bars of large diameter; it can use in every construction sites.
- ❖ Process of single bars bending is taking less time compare to manual hand bending

4.2. Disadvantages of the Project:

Dis-advantages of the project as per following like as:

- ❖ High installation cost

4.3. Application of the Project:

Our project should use for following various applications like as:

- ❖ Bending the Bar 6mm to 10mm



4.4 Future Scope:

The project has covered almost all the requirements. Further requirements and improvements can easily be done since the as per requirements is mainly structured or modular in nature. Improvements can be appended by changing the existing modules.

4.5 Conclusion:

It is observed that, this model, we can easily the concepts behind the design of the whole machine system, which together as a whole function as the rod cutting and bending automatic machine, are to produce a product which would require minimum setup time for different shapes and rod lengths, hands free operation, and minimum maintenance. In the original rack and pinion concepts there is bend rod of any shapes. These ideas were not implemented due to the thought that it would result in machine setup and programming, greater cost, and possibly greater maintenance requirements. The components designed and selected for the automatic bending machine are sufficient for performing the motions of the machine without failure

REFERENCES

- [1] C. Anbumeenakshi, M.R.Thansekhar, Thanamani.M, Santhoshkumar.R, Parivallal.S, Senthilkumar. K on “Design and Fabrication of Multirod Bending Machine” in International Journal of Current Engineering and Scientific Research (IJCESR) Volume 5, Issue 1, 2018
- [2] Thokale Manoj, Kothwal Satish, Kotkar Rahul, More Suyog, Pawase Mahesh on “Design and Fabrication of Pneumatic Bar Bending machine” in International Research Journal of Engineering and Technology (IRJET) Volume 4, Issue 3, March 2017
- [3] Aniket N. Gujar, Tejas D. Kadam, Vikram V. Shinde, Ganesh E. Chavan, Amit J. Mane on “Design and Development of Pneumatic Stirrup Bending Machine Automatic Stirrup Bending” in International Journal of Advance Engineering and Research Development Volume 4, Issue 3, March 2017
- [4] Sachin S Raj, S.Manickam, M.Meganathan, G.Nandhakumar, M.Pushparaj, Dr N.Balakrishnan on “Design of Automatic Pneumatic Sheet Metal and Paper Cutting Machine” in International Journal For Research In Mechanical & Civil Engineering Volume 3, Issue 4, April 2017
- [5] Ankit Vyas, Chandrakant Tiwari, Arnav Tulsian, Ankit Patel, Kiran Wangikar, Prashant Anerao on “Design and Development of Hydraulic Pipe Bending Machine” on International Journal of Research in Advent Technology (E-ISSN: 2321-9637) Special Issue National Conference "NCMMM-2016", March 2016
- [6] Subhash N. Waghmare, Dr.C.N.Sakhale, Dr.M.P.Singh on “Design, Development and Fabrication of Stirrup Making Machine Energized by Human Powered Flywheel Motor” in International Conference on Multidisciplinary Research & Practice Volume 1, Issue 8, May 2016
- [7] Vilas Shinde, Darshan Adhav, Suraj Jadhav, Afsar Attar, Sandip Gorde on “Design and Fabrication of Hydraulic Stirrups Making Machine” in International Journal of Innovative Research in Science, Engineering and Technology Volume 5, Issue 5, May 2016
- [8] Vijay Pal, Ramesh, Vinay, Venkata, Phani Babu.V on “Pneumatic TMT Bending Machine” in International Journal & Magazine Of Engineering, Technology, Management and Research Volume 3, Issue 5, May 2016