

# AUTOMATIC HYDRAULIC BAR BENDING MACHINE

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**Abstract:** 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.

## I. INTRODUCTION

Automatic bending machine is operated by electrical means, where the worker requires for supplying the bars and operating the switches only. It is moveable type machine, so it can be carried anywhere. This Automatic bending machine is preferred machine due to its low power consumption.

The hydraulic bending press is one of the most flexible machines in the market, allowing the fabricator or ironworker to shear, punch, bend, scroll, and press thousands of different parts. When considering industrial machinery, the hydraulic bending press is the perfect machine shop tool for the metal fabricator. The hydraulic pipe bending press fits any small to medium-sized industry when machinery for large-scale production must necessarily make way for machinery with distinctly lower production costs. The operating procedure of hydraulic pipe bending machine is simple when compared to other pipe bending machine. Tube bending as a process starts with loading a tube into a pipe bender and clamping it into place between two dies, the clamping block and the forming die. The tube is also loosely held by two other dies, the wiper die and the pressure die.

The process of tube bending involves using mechanical force to push stock material pipe or tubing against a die, forcing the pipe or tube to conform to the shape of the die. Often, stock tubing is held firmly in place while the end is rotated and rolled around the die. Other forms of processing including pushing stock through rollers that bend it into a simple curve. For some tube bending processing, a mandrel is placed inside the tube to prevent collapsing. The tube is also held in tension by a wiper die to prevent any creasing during stress. A wiper die is usually made of a softer alloy i.e. aluminium, brass to avoid scratching or damaging the material being bent. Much of the tooling is made of hardened steel or tool steel to maintain and prolong the tools life. However wherever there is a concern of scratching or gouging the work piece, a softer material such as aluminium or bronze is utilized. For example, the clamping block, rotating form block and pressure die are often formed from the hardened steel because the tubing is not moving past these parts of the machine.

In this type of machine, hydraulic fluid is transmitted throughout the machine to various hydraulic motors and hydraulic cylinders and which becomes pressurised according to the resistance present. The fluid is controlled directly or automatically by control valves and distributed through hoses and tubes. The popularity of hydraulic

machinery is due to the very large amount of power that can be transferred through small tubes and flexible hoses, and the high power density and wide array of actuators that can make use of this power. Hydraulic machinery is operated by the use of hydraulics, where a liquid is the powering medium. environment that will bring more profit to the end user. This series is a simple series where the operator controls the stroke in and the stroke back by two hand wheels. Simplicity means profit.

## **II. LITERATURE REVIEW**

**P.S. Thakare[1].** 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.

**H. A. Hussain[2].** 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.

**Mohan Krishna S. A.[3].** The aim of this project is to develop a pipe or bar bending machine which is useful to bend a pipe in workshop. This project is to design and construct a portable pipe or bar bending machine. This machine is used to bend steel pipes, bar 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 we designed manually operated pipe bending machine with use of motors, pulley, and frame. This bending machine is both manually and power operated.

**Mohammed, S.Ravivishwanth, N.Saravanan[4]** style and fabrication of hydraulic rod bending machine. This project minimizes the human effect but in case of stirrups making, it involves the manual effort because of cost efficient and labour work is involved to some extent.

## **III. WORKING**

Automatic Hydraulic Bar Bending Machine is operated by electrical motor. Automatic hydraulic bar bending machine is driven by motor. Hydraulic jack up down due to use of motor. Automatic hydraulic bending machine has higher production capacity than hand opened machine.

In this project we use sliding crank mechanism this mechanism helps to pumping the hydraulic jack.

### **For Bending :-**

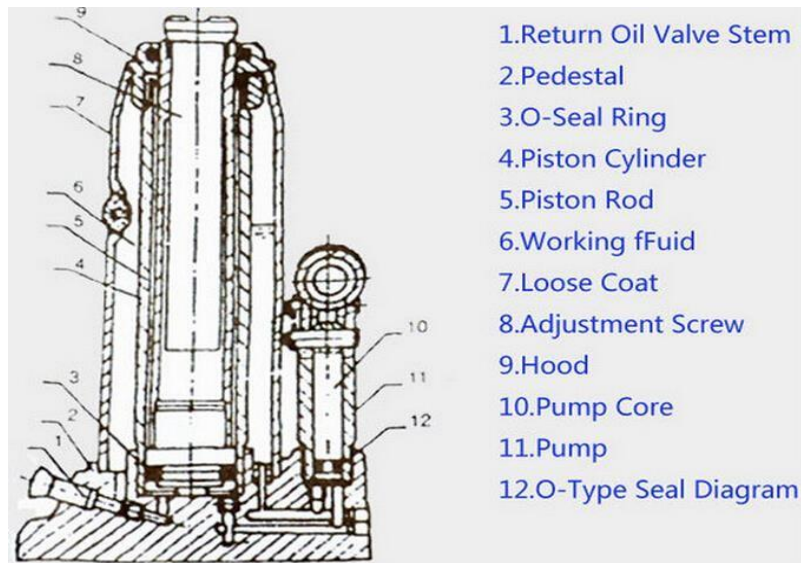
Firstly take a pipe and fit in the die holder. In the die holder screw is fitted for adjustment purpose of rod. As fitted in die holder. Hydraulic jack is connected to wiper motor and it connected to D.C supply when D.C supply is given to wiper motor, now motor start running and ram push in up word direction, where pulley is fitted at top. as the ram goes up word then rod also taken to top by the force of hydraulic jack and pipe get bend. By this we can bend the rod in V and L and shapes.

The Automatic Hydraulic Bar Bending machine has the following features:

Cylinder under work table allowing for better accuracy and more work surface;

User performs operation in front of the machine instead of the side of the machine making it easier to produce quality products, and frontal position on bending machine is protected and practical position for the operator;

Automatic hydraulic bar bending machine is by means of hydraulically controlled stroke end devices that allows for greater accuracy to limit switch stroke end control) allowing for continuous movement under pressure, achieving maximum accuracy and repeatability in position; and much more.

**IV. METHODOLOGY****Hydraulic Jack**

A hydraulic machine allows for constant load control and makes fast corrections after minor failures and load redistributions during a test, compared to the response of a screw drive. A hydraulic test machine also has greater flexibility for cyclic and vibrational testing than does a screw-driven machine.

**Battery**

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an



external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to additionally include devices composed of a single cell.

### Design of hydraulic jack:

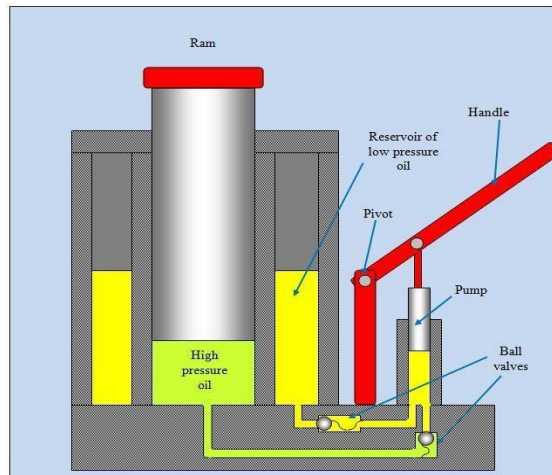
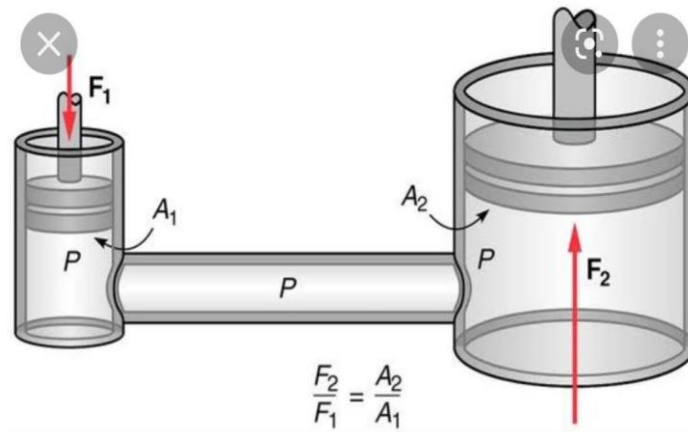
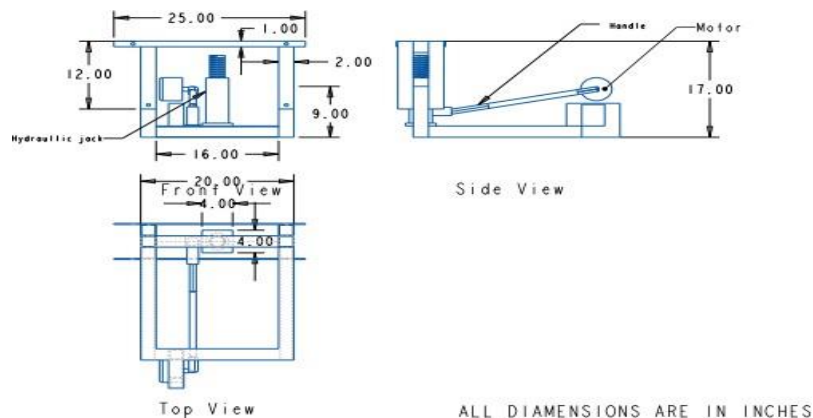


Fig. Hydraulic Jack



### Frame Dimensions-



**Advantages:**

1. Advantages of the project as per following like as: No conventional grid electricity required
2. Long operating life
3. Highly reliable and durable Easy to operate and maintain low installation cost

**Disadvantages:**

1. Dis-advantages of the project as per following like as: Operating speed is low
2. Maintenance cost high Skilled operator required

**Application:**

1. Our project should use for following various applications like as: Industrial purpose
2. Domestic purpose Commercial purpose Automobile application

**V. CONCLUSION**

The “Hydraulic Pipe Bending Machine” is working with satisfactory conditions. Before concluding a point to note is that the particular pipe bending machine which we have designed for multiple operation. To facilitate the above, there is a provision in the frame to change the table if necessary. Thus if we want to perform any press operations using die and punch, than a table having a provision to hold a die can be used and corresponding punch can be fixed to the ram end. Such type of bending machine more important for small scale work as well as industrial work in less cost and more precision and accuracy of different type of pipe bending. The machine capacity can be increased according to the need. It should be noted the tendency to wrinkle and the cross section of tube deformation are reduced. Thus, this approach can be used for bending a thin walled tube over a small radius of the die, which can be achieved with a conventional method of bending the tube. The most important outcomes of present research have been concisely summarized as follows: The present methods for bending rod, pipe and metal strips are of great significance for modern job order type production workshops. The situation where the workshop owner can't afford different machines for different application such as for pipe bending. So this machine is become an option for such type of workshops. Automatic Bending Machine” is affordable to them at optimum cost and it will be able to bend both rod as well as pipe. It also helps to reduce shop floor area as it can assemble and dismantle easily whenever required. After observing the results obtained from machine study we are able to know that cost required for this machine is much less than other machines available in the market. This machine also has the advantages of less cost, multi functioning, easy assembly and dismantling according to need, optimum accuracy, easy to use, no slipping action of pipe etc. In short this is very useful for small scale workshops having less investment.

**VI. FUTURE SCOPE**

- There are many ways to improve this machine to the next level of machining.
- By increasing size of the bearings and rollers, we can bend any shapes and sizes.
- By reducing the weight by alternate consideration of materials for base frame and rollers.
- By changing the roller's material, we can increase the efficiency of the machine.
- By introducing electrical and electronic components we can reduce human efforts.
- After alternate material consideration increasing the size also plays a role for small scale enterprises to work effectively.

**VII. REFERENCES**

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