

Fabrication of Roller Bending Machine

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Abstract - The main purpose of the research paper is to explain the design and developed hydraulic powered roller bending machine. It is used for Construction, Aerospace, and Automobiles & Industrial. It's time consumption process. It reduces human effort and also required low less skill to operate this machine. We are designing hydraulic powered roller bending machine with use of roller, bearing, hydraulic jack, & support (frame). The objective of the subject is to make new design of manually and hydraulically operated roller bending machine and stress acting on Metal after bending of Metal. The Metal bending machine is use to bend Metal in different angle shape and curvature as requirement of work. The machine is useful to bend different thickness Metal 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.

Metal. In Metal bending process the thickness of Metal is change. The acceptability of Metal bend is depending on magnitude and shape imperfection. Then we also study on failure analysis of Metal bend in these we assume Metal bend is uniform thickness.

2. CONSTRUCTION



Fig-1: Construction of bending machine

Key Words: Roller, Hydraulic Bottle Jack, Fabrication, Bending Operation

1. INTRODUCTION

Due to increase in globalization it is very important to produce goods with high precision and high accuracy or reliability. Metal bending machine is mostly use in fabrication industry generally using bending machine produce U-shape and V-shape. In the design of metal bending machine we use only three rollers for the bending of Metal in different angle due to the number of compost use overall cost of machine low and machine portable type the weight of the machine is less than is very full portable. Our project is to design and construct a bending machine. This machine used to bend Metal into curve or other curvature shape. The size of the machine is very convenient for portable work. In various fabrication works as well as in architectural work Metal are use in different ways. To bend these Metals into these artistic forms is not easy thing to be done manually. Using a particular machine specially developed for bending of Metal help. Choosing component material is very important, because it will affect the overall cost of the machine and product quality. With this consideration, we will design this machine with the maximum quality and low cost, In Metal during bending operation stress concentration is occur in bend area of Metal the bend section may be damage during service in particular case where significant validity and thickness version exist which are introduce during menacing process and operation time. Hence the acceptance of Metal depends on magnitude and shape of

The model of this project consists of following main components

- Bending Rollers
- Spindle Wheel
- Bearings
- Hydraulic Bottle Jack
- Housings
- Screw
- Moving Roller
- Supporting Frame
- Mounts
- Joints & Fasteners

3. CONSTRUCTIONAL DETAILS

Here we are going to discuss over few of very important components required for this machine in details. These are as follows,

3.1 Bending Roller

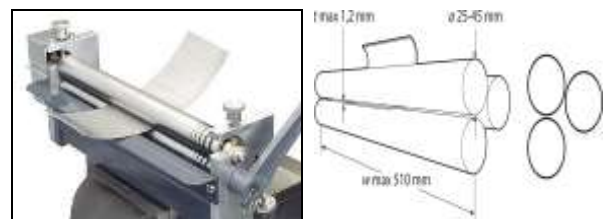


Fig-2: Bending Rollers

Bending is to be done on sheet metal or metal bars, thus we are going to use solid steel bars as a roller.

3.2 Spindle Wheel



Fig - 3: Spindle Wheel

Spindle Wheel is an attachment made to one of the base roller to drive the system. This will help to perform rotations of rollers to obtain uniform pressure over entire affected area.

3.3 Bearing



Fig-4: Bearing

Bearing is a mechanical element provides support and also helps to reduce friction during rotations. There is variety of bearings available for every mechanism. The selection of bearing should be done on the basis of load applied and area of application.

3.4 Hydraulic Bottle Jack



Fig-5: Hydraulic Bottle jack

Hydraulic bottle jack is used to provide pressure over material undergoes bending during operations. This can be done manually but there will be some limitations arise for applying forces.

3.5 Fastener & Hinge



Fig-6: Fasteners & Hinge

We are going to use different types of joints and screws for assembly of this machine.

4. OPERATION & WORKING

The working of this machine is very simple to perform. The basic principle of operation is to apply pressure over the pipe or metal by using hydraulic system. We are going to use hydraulic bottle jack for this purpose. A pipe or metal undergoing bending operation should insert from one end of the machine through the rollers provided in particular manner as shown in figure above. When this metal got inserted, the rotating operation gets started. After specific rotations the pressure should started to apply in upward direction, which helps to move end side body in upward direction. This movement of end side body results in the formation of deflection of pipe or metal inserted.

5. Material Selection

Sr. No.	Name of Entity	Required Properties	Probable Material
01	Bending Roller	<ul style="list-style-type: none"> Tensile Strength Hardness Resilience 	<ul style="list-style-type: none"> Mild Steel, Steel Alloys
02	Bearing	<ul style="list-style-type: none"> Corrosion Resistance Thermal Conductivity Hardness 	<ul style="list-style-type: none"> White Metal, Bearing Steel
03	Base Frame / Support Frame	<ul style="list-style-type: none"> Tensile Strength Machinability Resilience Hardness Availability 	<ul style="list-style-type: none"> Mild Steel, Plain Carbon Steel, Alloy Steel etc
04	Joints	<ul style="list-style-type: none"> Corrosion Resistance Strength Reliable Availability 	<ul style="list-style-type: none"> Stainless Steel

Table-1: Material Selection

6. ADVANTAGES & DISADVANTAGES

6.1 Advantages:

- Very Useful in Fabrication
- Easy To Make Curved Parts
- Supports a Variety of Soft Metals
- Quite simple
- Compact
- Less cost
- Easy maintenance

6.2 Disadvantages:

- Leakage of oil affects the working efficiency.
- It may be limited to specific dimensions to be designed for.
- It may slightly slow for heavy load operations.
- Just single component is suitable for operations.

7. APPLICATIONS

- Used in small and large-scale industries for metal rod bending operation.
- Used in civil engineering for bending pipes.
- Used for manufacturing of steering wheels, round bars etc.,
- Used in Automobile vehicles.
- Used in various fabrication applications for home decors.

8. FUTURE SCOPE

- In a future this machine can be operated by using Electrical, Pneumatic, and supply.
- We can be used for different curve and different shape of pipe.
- This machine is design by using two or more pulley arrangement.
- Movable stopper is used to give more accuracy.
- Pipe bending machine is higher initial cost involved we have tried to make the system cost effective and also add different enhancement to make the system more efficient so that it may work around the year.

9. CONCLUSIONS

This project will work effectively with designed specifications. This will also helpful to perform bulk operations. This project is done with the hope of providing cheap and easier way to perform such operations. This will be economical and efficient too. Such type of bending machines are 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. Manual bending tends to minimize wrinkles and can reduce springback. By its design the defects can be easily overcome. Simpler design not only

reduces the defects but also contributes to fluid pressure test during bending.

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. In this paper, the problem of bending and axial stretching the internal pressure is investigated using the machine coordinate system (CMM) measurement. The objective of the study is to develop a tool that accurately predicts the change of the wall thickness and the cross-section of the tube distortion under different loading conditions.

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