

MANUAL ROLLER BENDER

Chintan Panchal¹, Vivek Prajapati², Utsav Rana³, Mayur Shukla⁴, Mr. Mukundrai khandubhai Patel⁵

^{1,2,3,4} (Department of Mechanical Engineering, Government Engineering College, Bharuch, India)

Abstract:

The main problem that peoples, who are occupied with doing various metallic projects and generally, constructions, is the bending of metallic pieces. The reason that this problem is arise during these projects is because the metallic pieces need a lot of pressure, strength as well as accuracy to be bent. There are many machines to be used to achieve this but the cost is high. Although, the metal roller bender has been already made once by the ‘make it extreme’ team, the particular construction was not affordable by anyone as more specialized machines were needed to be made than the ones that can be found in any home. Therefore, it is relatively affordable, is extremely useful and it will fill with feelings of joy and satisfaction.

Keywords —Roller Bender, Manufacturing, Workshops.

I. INTRODUCTION

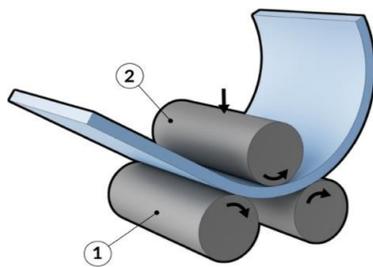
Gum/AR d E. EABERG' Patented Apr. 6, 1954 UNITED STATES PATENT OFFICE PLATE BENDING MACHINE Application February 19, 1953, Serial No. 337,808 Such machines involve certain well-known difficulties in respect of bending plates into conical shape. The invention has for its object to remedy this drawback and to enable, by including auxiliary means, the bending of conical mantles and the like. The main characterizing feature of the plate bending machine according to the invention resides in that it comprises a pin which is adapted, during the bending operation, to be moved into engagement with one of the rolls in a substantially radial direction so as to serve as an abutment for one edge of the blank to be bent. These gear wheels are engaged by a common pinion (not shown) which rotates the lower rolls in the same sense. The source of power may be an electrical motor. The upper roll of the machine is mounted with one journal in a bearing which is vertically adjustable in the end member I by means of a screw. Its other journal is,

in a similar manner, mounted in a bearing which is vertically adjustable by means of a screw II and is mounted in a bracket on the right-hand Frame end member. The bracket has a pin which engages a bore or bearing I in the frame end member 2, and is provided with a suitable locking device whereby it can be secured to the frame end member in a vertical position. After the bending operation the bracket I3 may be pulled slightly outward and be turned laterally whereby the bent plate can be removed from the machine. In modern days, all area of industries is going to like automated, economical and accurate machine equipment. There are many types of pipe bending machine available in market like hydraulic pipe bending machine, pneumatic pipe bending machine, manual pipe bending machine etc.

II. METHODOLOGY

Bending implies the deformation of a workpiece produced by loads perpendicular to its axis as well as force couple acting in a plane passing through the axis of the bar. Bending is only occurred when

load is acting perpendicular to the neutral axes of pipe. The 3-roll bending is also used for producing work pieces with large bending radii. The method is similar to the ram bending method, but the working cylinder and the two-stationary counter-rollers rotate, thus forming the bend. Normally there are 2 fixed rollers and one moving roller and the work piece is passed forward and backward through the rollers while gradually moving the working roller closer to the counter rollers which changes the bend radius in the pipe.



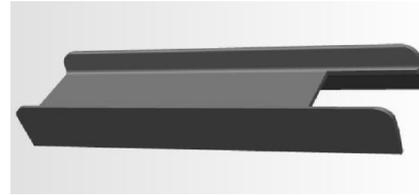
A. Roller Bender

A roll bender is a mechanical jig having three rollers used to bend a metal bar into a circular arc. The rollers freely rotate about three parallel axes, which are arranged with uniform horizontal spacing. Two outer rollers, usually immobile, cradle the bottom of the material while the inner roller, whose position is adjustable, presses on the topside of the material.



B. Design Process

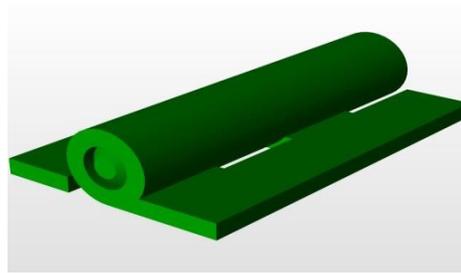
We used I-beam for making the base structure of our machine. I-beam's material is mild steel. We have cut the sections like shown in figure and made base of roller bender as shown in right sides figure. We have jointed parts using welding process.



PROTOTYPE OF I-BEAM (BASE)

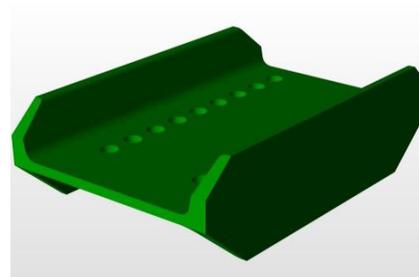
To start with, we used a piece of home girder with total length 144 cm, 18 cm width and 9 cm height. Then, we cut it in four pieces, 3 pieces of 28 cm and another one of 60 cm. We made the basis of our machine by putting the long piece on the basis and then we welded one of the pieces of 28 cm vertically, on it. On the last piece, we connected another one piece of 28 cm horizontally. In this way, we completed the basis of our machine.

We use this type of hinge in our roller bender which is indicated in figure. We used hinge for one part of our structure be movable.

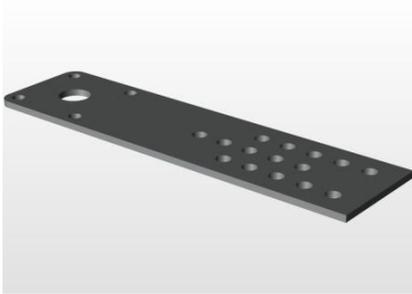


PROPOTYPE OF HINGE

We made holes on metal plates using drilling machine. We made holes on plates because we can adjust height of driving shaft by adjusting height of driving shafts, we can bend different width's plates and strips.

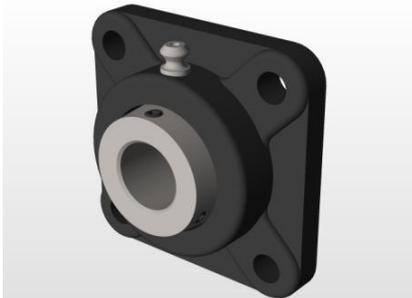


PROTOTYPE OF I-BEAM (AFTER MAKING HOLES)



PROTOTYPE OF METAL PLATES (AFTER MAKING HOLES)

We used to bear with housing for driving shafts. we clamed bearing with housing on metal plates. so, when we adjust height of plates, we will get different gaps between driving and driven shafts. so, we can use it to bend pipes and strips having different diameter and width.



PROTOTYPE OF BEARING WITH HOUSING

We used three shafts of High stainless steel in our machine. one as a driven shaft and another two as driving shafts. we do knurl on driven shaft. we get more grip because of knurling. We used hydraulic jack having capacity of 4 ton. we are using jack to give inclined angle to moving part of roller bender as shown in figure.

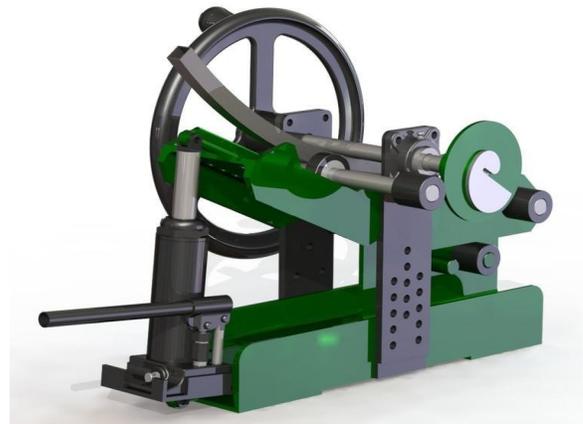
Regarding the remaining piece, we connected it with a hinge of 20mm thickness and 18cm length on the horizontal, stable piece of 28cm. In this way, we created the moveable piece of the metal bender that regulates the inclination that we want to have on the bending pieces.



PROTOTYPE OF HYDRAULIC JACK

C. Final Assembly

This will be the final assembly of our model and ready to use for the purpose.



PROTOTYPE OF MANUAL ROLLER BENDER

III. CONCLUSION:

Our bending machine is less expensive light in weight in compare to other automatic machines so, it can be preferable for small industry holders, small workshop holders, in college institutes etc. It will be reduced time of operation, easy to use, will be giving more work in less effort, can be bend metal up to 8 mm thickness, and takes less set up time. We can use it in small fabrication yards, in welding shops, in institutes for study of students.

REFERENCES

- [1] Pachanga, R., Patil, A., Naik, N., Ajmani, N., Bant, P., & Shivaprakash, M. V. (2019). DESIGN AND FABRICATION OF MANUAL ROLLER BENDING MACHINE.
- [2] "Design of Manual Roller Pipe Bending Machine ", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.6, Issue 4, page no.692-694, April-2019.
- [3] Arumugam, Anand Jayakumar (2018). Design and Fabrication of Roll Bending Machine.