

Design Of Manual Roller Pipe Bending Machine

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Abstract : Here we study the design and fabrication of a manual roller bending machine that uses chain sprocket based roller mechanism to bend pipes/rods. This mechanism is widely used in industry to for bending purposes. The machine is made with a frame that supports the roller mechanism between it. The material to be bent can then be rolled across it to achieve desired bending. The rollers are fitted with bearings so as to achieve the desired operation. The roller is integrated with a hand driven spindle wheel to drive it manually. This is used to adjust the bending angle. In the frame center the mechanism fitted through a slot. This mechanism along with the spindle powered rollers allows the user to achieve desired bending.

Keywords - pipe bending, 3 roller, frame.

1. INTRODUCTION

In modern days, all area of industries are going to like manual, economically and accurate machinery. There is many types of pipe bending machine are available in market like hydraulic, pneumatic, manual pipe bending machine etc. The utility model discloses a manual pipe bending machine. The clamps carries lower pulley and the parallel shaft are clamped on the base. Pulley are driven by chain drive mechanism. Here two guide ways are use for guide the working pulley for up & down linear motion. Lead screw provide a motion to pulley. The lead screw is get rotary motion with the help of hand wheel. Guide way and lead screw are fitted between two horizontal supporting plate, which are fitted on frame by the help of the two vertical parallel supporting plate.

This study is about the work of designing a bending machine to bend a pipe. A bending process is used to bend a metal. The metal can be a sheet metal, tubes, square hollow and rod. This type of metal has its own thickness. The bending machine designer will take into consideration a number of factors including type of metal, type of the roller bender, power driven or manual and the size of the bending machine. Usually, the difference of these types of bending machine is only on the capacity of the bending machine that can bend a sheet metal or tube. Today, the bending machine that available in the market is for the sheet metal and tube bending machine. on the basis of capacity of bending machine, many makers vary their products and power driven or manual. Most of the machine uses roll bending type. This type of machine has three rolls in which one roll is fixed and the other two are adjustable. The metal pipe needs to put in the roller and then rolls around it until the desire shape is acquired. The products that can be produced with this machine are various curves, structural elements, automobile parts etc. The proposed machine uses a new method. The bending radius is controlled by the relative distance and orientation between the mobile die and the tube.

2. PROBLEM STATEMENT

Labour cost is more.

Time consuming in case of setting of operation setup.

Tremendous amount of human effort is necessary.

3. OBJECTIVE

The main objective of this project is to improve accuracy of Product at economical cost. This model that gives better accuracy with minimum material waste. It is a portable machine.

4. LITERATURE REVIEW

Prof. A.D.ZOPE et.al has developed during the roll bending process the sheet or plate or pipe is passed through consecutive rollers that gradually apply pressure on pipe. Because of this pressure the change in radius of pipe or sheet occurs. The aim of this project is to develop a metal bending machine. This machine is used to bend sheets into curve and the other curvature shapes. As the comparison of other machine this is very small. And it is convenient for portable work. We are developing manually operated metal bending machine with use of metal shaft, hydraulic bottle jack, pedestal bearing and support (frame). This machine works on simple kinematic system. Due to its light weight and it is portable so it can be used by small workshop, fabrication shop, small scale industry etc. Bending machine is a common machine in machine shop that is used to bend a metal. The roller is used for bending the metal. There are 3 roller used in bending machine. The common product of metal bending machine are pipe (square and circular) bending if separate attachment of die is provided, sheet bending. During the roll bending process the sheet or plate or pipe is passed through consecutive rollers that gradually apply pressure on pipe. Because of this pressure the change in radius of pipe or sheet occurs. The rolling process is generally performed by a three roll bending machine often called as pyramid type, because of these types of arrangement of the three rollers.

Prof. ANAND JAYKUMAR et.al this innovation has made more desirable and economical. It is helpful to constructional areas and some industries. Bending is a process by which working metal can be deformed by plastically deforming the working material and changing its shape. The material is stressed below the ultimate tensile strength but beyond the yield strength. Roll bending may be done to both sheet metal and bars of metal. If a bar is used, it is assumed to have a uniform crosssection, but not necessarily rectangular, as long as there are no overhanging contours, i.e. positive draft. The portion of the bar between the rollers will take on the shape of a cubic polynomial, which approximates a circular arc. The rollers are then

rotated moving the bar along with them. The amount of spring back depends upon the elastic compliance (inverse of stiffness) of the material relative to its ductility.. When the handle is pressed once the oil inside the cylinder helps the piston rod to move upwards.

Prof.NILESH W.NIRWAN et.al developed model under FEA analysis. A beam deforms and stresses developed inside it when a transverse load is applied on it In the quasistatic case the amount of bending deflection and stresses that developed are assume not to change over time .in a horizontal beam supported at the end and loaded downwards in the middle the material at the overside is stretched. There are two forms of internal stresses caused by lateral load. Roll forming ,Roll bending or plate rolling is continuous bending operation in which long strip of metal is passed through consecutive sets of roll,or stand, each performing only an incremental part of the bend ,until the desired crosssection profile is obtain.Roll forming is ideal for producing part with long length or in large quantity. There are three main processes: 4 rollers,3 rollers 2 rollers, each of which as a different advantages according to desired specification of output plate.

The material is fed in between two rollers called working rollers rotated opposite direction. the gap between two rollers less than the thickness of starting material, which causes it to deforms, in material thickness caused material to elongate .the bending function is useful tool for shaping all manner of components out of flat strips , square bar and round wire in a production environment.The three roll push bending is the most commonly used free form bending process to manufacture bending geometry consisting of several plane bending curve , the position of the forming rolls defines the bending radius.

Prof.AKBAR H.KHAN et. al developed low cost, less effort required manually operated pipe bending machine. This paper gives the brief description about the design and construction of the pipe bending machine which is used to bend metal pipes into curve and the other curvature shapes, the size of machine is very convenient for work. It is fully made by steel. It is easy to be carry and use at any time and any place. It reduces human effort and also required low less skill to operate this machine. We designed manually operated pipe bending machine with use of dies, gears and support (frame). Our objective is to increase accuracy at low prize without affecting the pipe bending productivity. This machine works on simple kinematic system. This machine can bend up-to 01-10 mm thickness of pipes. The operating procedure of manually operated pipe bending machine is simple when compared to other pipe bending machine. Bending as a starts with loading a tube into a pipe bender and clamping it into place between two dies, the clamping block and the forming die. when a force is applied on the

jack arm; there will be a tendency for the whole machine to rotate over one of the tripod struts. jack giving a small feed of motion (2 mm per time). The small feed is an advantage. It gives a chance for very reliable. The manufacturing of this Machine is done in the workshop and all the work is been done with the help of welding, drilling alignment and the lathe machine. The machine can be run by one operator, but a second hand to help handle the pipe is recommended. Keeping the ends of the pipe at the same level throughout the bending process is essential to keep "spiralling" effects to a minimum. The replication of identical parts was achieved in a short amount of time, eliminating the need for the pipe to be shipped off for "hot" bending work. The pivoting head acted like a vice, eliminating pipe slippage, and providing for safer operation.

Prof.PRASHANT P. KHANDARE et.al this machine is used to bend steel pipes into curve and the other curvature shapes. It is fully made by steel. Moreover it is easy to be carry and use at any time and any place. It reduces human effort and also required low less skill to operate this machine. We are designing manually operated pipe bending machine with use of pulley, motors, gears and support (frame). Therefore, our objective is to increase accuracy at low prize without affecting the pipe bending productivity. The bending machine designer will take into consideration a number of factors including type of metal, type of the roller bender, power driven or manual and the size of the bending machine.Today, the bending machine that available in the market is for the sheet metal and tube bending machine. This type of machine has three rolls which is one roll is fixed and the other two are adjustable.

5. WORKING

Three-roll bending is used for producing work pieces with small bending radii. Normally there are 2 fixed pulley and one moving pulley and the work piece is passed forward and backward through the pulley while gradually moving the working pulley closer to the counter pulley plays important role to changes the bend radius in the pipe. This method of bending causes very little deformation in the cross section of the pipe and is suited to producing coils of pipe as well as long sweeping bends like those used in powder transfer systems where large radii bends are required. With the guidance of stationary pulley pipe is enter through one side of machine. Pipe is held at the initial point of second pulley, after enter the sufficient distance in display. For producing uneven shaped pipe we required upward and downward movement of upper pulley By entering various amount of distance as the shaped required the upper pulley moves up and down for generating uneven shaped pipe. The continuous radius of curvature can achieved of pipe.

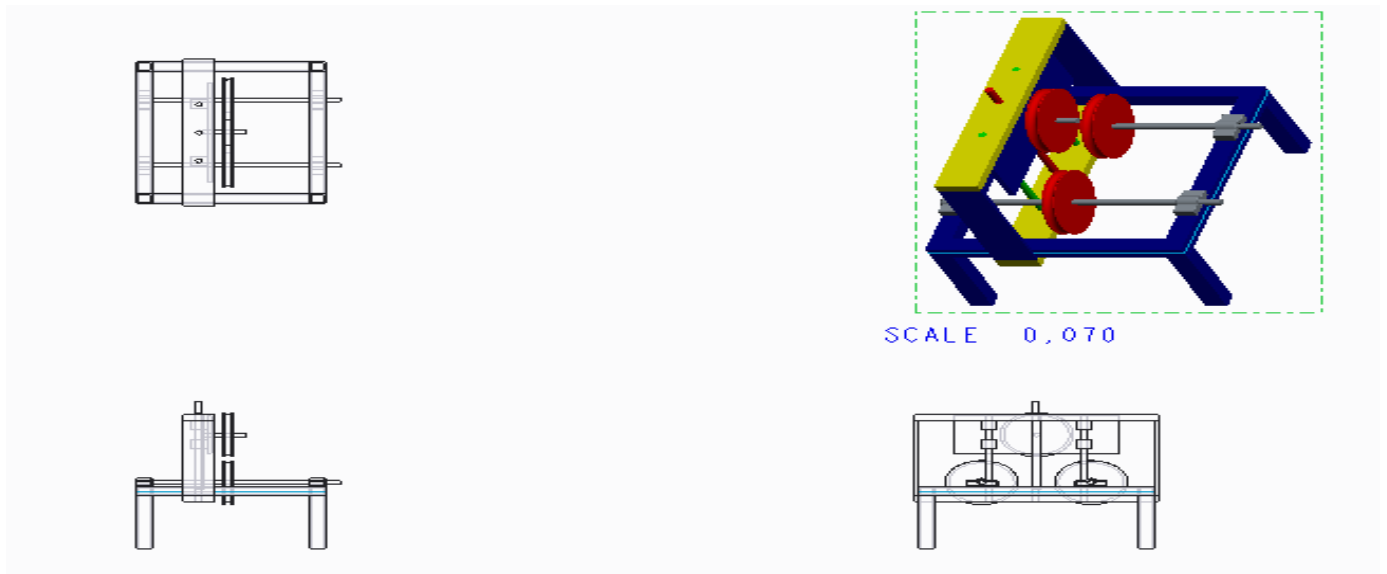


Fig. (1) Working Model

6. FUTURE SCOPE

We can modify the bending machine to bend tube and pipes by changing the roller guides. Semiautomation and automation of the hydraulic bending machine by adding different components.

7. CONCLUSION

Manual bending tends to minimize wrinkles and can reduce springback. The defect can be easily overcome by this design. Simpler design not only reduces the defects but also contributes to fluid pressure test during bending. 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 problem of bending and axial stretching the internal pressure is investigated using the machine coordinate system 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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