

Pneumatic Pipe Bending Machine

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ABSTRACT

The main objective of this paper is to implement the Pneumatic Pipe bending machine in the construction sites with less cost compared to the existing bending machines, and increasing the productivity of the stirups. 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 labour and integration of business systems. Automation is achieved with the help of pneumatic system.

I. INTRODUCTION

This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

Degrees of automation are of two types, viz.

- Full automation.
- Semi automation.

In semi automation a combination of manual effort and mechanical power is required whereas in full automation human participation is very negligible.

II. PIPE BENDING

Pipe bending is a technique used in various metal forming processes with the aim of increasing the fabrication capabilities of plumbing fixtures. The pipe can be bent at varying angles and in different directions. The simplest curve turns the tube at an angle of 90 degrees forming an elbow. Besides, pipe bending can be done in several other geometries that include 2D and 3D dimensions.

Pipe bending can be done by different machines like human powered, hydraulic assisted, electric servomotor, and pneumatic powered.

III. CHALLENGES IN PIPE BENDING

Via the analysis of bending characteristics and multiple defects, advances on exploring the common issues in tube bending are summarized regarding wrinkling instability at the intrados, wall thinning (cracking) at the extrados, springback phenomenon, cross-section deformation, forming limit and etc.,

IV. PROBLEMS FACED IN MANUAL PIPE BENDING MACHINE

When bending tubing or piping, the quality, size, and consistency of the weld seam (if applicable) are very important. If the edges of the weld joint aren't perfectly aligned, the tube or pipe roundness can be negatively affected, which will create issues, such as elongation and inevitably wrinkling, during bending.

EXISTING MODEL FIGURE



Figure 1

IMPROVEMENT OF MATERIAL HANDLING

- The Manual operation can be done by the usage of pneumatic system.
- The bending wheel in the manual operated machine can be replaced by the movement of base plate.

DRAWBACKS IN AUTOMATIC PIPE BENDING

- Automated bending offers speed, quality and injury prevention but has drawbacks too.
- It's expensive, needs engineering support, and takes time to set up. For shorter production runs manual bending comes out ahead.

V. WORKING METHODOLOGY OF OUR PNEUATIC BENDING MACHINE



Figure 2

The compressed air from the compressor is used as the force medium for this operation. There are pneumatic double acting cylinders, solenoid valve; flow control valve and timer unit used. The arm from the compressor enters to the flow control Valve. The controlled air from the flow control valve enters to the solenoid valve. The function of solenoid valves all of air correct time interval. The 5/2 solenoid valve is used. In one position air enter to the cylinder and pushes the piston, so that the cutting stroke is obtained.

The next position air enters to the other side of cylinder and pushes the piston return back, so that the releasing stroke is obtained. The speed of the cutting and releasing stroke is varied by the timer control unit circuit.

In this paper the rod is bend with the help of pneumatic force. The pipe is bending automatically with the help of arrangement. In this paper our aim to bend 3mm diameter of bar. We can make the stirrup of required dimension by using limit switch arrangement. In this, when the pipe is touches to the limit switch that time limit switch gives signal to the control unit, then control unit stop the motor and feeding of rod is stop automatically.

ADVANTAGES

- Machining Time Reduced
- Quick response is achieved
- Simple in construction
- Easy to maintain and repair
- Cost of the unit is less when compared to other Machines
- No fire hazard problem due to over loading

DISADVANTAGES

- While working, the compressed air produces noise therefore a silencer may be used.
- High torque cannot be obtained
- Load carrying capacity of this unit is not very high

VI. CONCLUSION

- The testing was done on aluminium pipe of 20mm OD and 1.5mm thickness and MS pipe of 1 inch(25.4mm) and 0.5mm thickness.
- The trial for aluminium pipe was done by filling fine sand to reduce the pipe thickness at bent portion.
- The aluminium pipe of 20mm OD and 0.8mm thickness was made bend successfully upto 70 degrees by application of 5 bar pressure and control of compressed air by flow control valve.

In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus we have developed a "PNEUMATIC PIPE BENDING MACHINE" which helps to industrial and construction appliances. In this project, we have combined the mechanisms of mechanical and automatic mechanisms using an electronic control units which actually moves and helps in bending the pipe.

VII. REFERENCES

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