Automatic Pipe Cutting Machine

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ABSTRACT

There are many industrial applications where round bar or square bars are required to be operated on different machines to make machine components such as Shafts, Bolts, Screws, etc. This needs more and more number of pieces to be cut for mass production of those components. The bar feeding mechanism is a metal cutting machine tool designed to feed the metal. The machine is exclusively intended for the mass production and they represent faster and more efficient way to feed the metal. In this project we are designing and developing automatic pipe cutting machine which will be useful to feed the bar to the cutter automatically and then cutting the same. It is able to cut metal bars of different materials and will be helpful in many industries due its compatibility, reliability and efficiency.

Keywords: Bar feeding mechanism, Cutter etc.

1. 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. Mechanical engineering without production and manufacturing is meaningless and inseparable. Production and manufacturing process deals with conversion of raw materials inputs to finished products as per required dimensions specifications and efficiently using recent technology. The primary concern of this system is to carry out three operations Feeding, Clamping and cutting. The sequenced operations of the system must be precisely timed. The major work of this system is to slice out large number of jobs in rod or pipe form according to the batch production. The selection of cutter is based on the stress calculated considering the pipe or rod material. The material preferred in this system is a PVC (polyvinyl chloride) pipe for demonstration. But mild steel rods and pipes also be worked out by using different cutters specifications. The cutter to be used in the machine system has been considered by calculating the torque required for cutting PVC object by help of the design data available. With the help of this system the time required to slice the objects like the pipe or rod will be less the accuracy of slicing or cutting of the material will also be improved. The system can be handled by semi skilled operators with ease. The layout of the machine is compact to be placed in a small workshops. Automation or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching in telephone networks, steering and stabilization of ships, aircraft and other applications with minimal or reduced human intervention. Some processes have been completely automated. The biggest benefit of automation is that it saves labour, however, it is also used to save energy and materials and to improve quality, accuracy and precision. The term automation, inspired by the earlier word automatic (coming from automaton), was not widely used before 1947, when General Motors established the automation department. It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s. Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, and electronic and computers, usually in combination. Complicated systems, such as modern factories, airplanes and ships typically use all these combined techniques.
1.1 Types of Automation
One of the simplest types of control is on-off control. An example is the thermostats used on household appliances. Electromechanical thermostats used in HVAC may only have had provision for on/off control of heating or cooling systems. Electronic controllers may add multiple stages of heating and variable fan speed control. Sequence control, in which a programmed sequence of discrete operations is performed, often based on system logic that involves system states. An elevator control system is an example of sequence control. The advanced type of automation that revolutionized manufacturing, aircraft, communications and other industries, is feedback control, which is usually continuous and involves taking measurements using a sensor and making calculated adjustments to keep the measured variable within a set range.

1.2 Scope of the Project
Pipe cutting machines are popular in offshore, pipe processing, ship building, pressure vessel, structural and mechanical contracting manufacturing because of the complex cuts and profiles typical required in their respective industries. Some common pipe cutting applications are: pipe work, industrial steel structures, stadiums, cranes, nozzles, and pipe laying stingers. Our machine will be useful in many applications still it can be used for small scale production only. So it can be modified for mass production by further automating the operation of the machine. Also now we have developed only prototype hence it can cut the PVC pipe. In future if we increased torque developed by the cutter on the workpiece, we will also be able to cut hard material pipes like steel, aluminium, etc.

2. WORKING
Our project “Automatic Bar Feeding Mechanism” Bar feeding mechanism is used to feed the raw material into the machine automatically when a set of operation is finished, it consist of two set of rollers one is ideal and another is drive roller, ideal roller are used to guide the job and feed roller has a driver from a D.C motor. A vice is connected to the frame so as to guide the pipe being cut before the cutter. The pipe is fed to the cutter assembly which is sliding with the help of lead screw mechanism. The cutter cuts the pipe.

2.1 Components
1. Cutting machine
2. DC motor for cutter
3. DC motor for pipe
4. DC motor for VICE
5. VICE clamp
6. PVC pipe
7. Cutter blade
8. Roller arrangement to move pipe
2.2 Advantages
1. Loading time reduced due to automation achieving faster production.
2. Mass production is possible with little modification.
3. Easy setup.
4. Can be operated with unskilled worker.
5. It is portable.
6. Less maintenance

2.3 Disadvantages
1. Additional cost required to do further automation.

2.4 Applications
Our project has wide range of applications in industries:
1. Small and medium Metal Cutting Industries.
2. Workshops

3. CONCLUSION
Thus, this work provides an alternative to the existing automatic PVC pipe cutting machine, in terms of automating the pipe entry into the cutting apparatus, eliminates power fluctuation and lesser initial investment. Time consumption is less when compared to manual cutting. This work provides the desired output for automation and fabrication. This machine is very useful for small scale industries.

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