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# SEMI-AUTOMATIC PVC PIPE FEEDING AND CUTTING MACHINE

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**Abstract:**
Identical PVC pipes in particular length are required for electrical work, plumbing work etc., for this purpose, workers spend more time and energy to cut the pipe. So, to save the time and energy of the workers, this project work is fabricated. In this project work, the PVC pipe is cut with the help of feed mechanism. A roller is connected with motor used to feed the work piece for the desired length and the vice which is used to hold the PVC pipes. When the motor starts, lead screw move the cutting tool downward for cutting the PVC pipes. After cutting, the motor is rotated in anti-clock wise while the cutting tool moves upward. This automatic operation has done by using an electronic control unit to complete the operation.

**Key Words:** PVC, Feeding and cutting, roller.

**Objective:**

Main objective of our project is to increase accuracy, reducing man power and to fulfill need of production in shortest possible time. It is also used to perform the most rigid operation with high speed cutting and when it is used in industrial oriented application, the production rate can be increased.

**Introduction:**

In semi automation a combination of manual effort and mechanical power is required.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 and cutting. The material preferred in this system is a PVC (polyvinylchloride) pipe for demonstration. 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

**Literature Review:**

Bipinchandra. et. al. (2016) has designed and fabricated Automatic-Pneumatic Pipe Cutting Machine. Pneumatic mechanism is used in machine which reduce the manpower, maintains the accuracy in pipe cutting process, fulfilled of mass production in shortest possible time.

Prof. Iman Hajizadeh Chi-Ghun Lee et al, (1992) studied „alternative configuration for cutting machine in a tube cutting mill". In this paper stock material exist as a continuous stream. They formulated and solved the new type of cutting stock problem and demonstrate that significant saving is expected when the new configuration is employed. The paper conclude that opening the end of the cutting machine they have shown numerically that the production time could be decreased by up to 44% such improvement would help production managers in tube mills reduce costs such as finished product inventory, labour cost.

Menghaniet. al. (2017) has developed automatic pipe cutting machine to cut the bar. Due to its compatibility, reliability it is able to cut bars of different materials. It 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.

**Problem Identification:**

The common problems we are facing while cutting are cross cutting of pipes, time management, cutting time and man power etc. The base of the pipe cutting operation is not properly fixed such that while cutting there occurs a cross cutting the base part is hold by hands such that while cutting, the pipe will move rapidly and due to the cross cutting operation occurs. If pipe diameter is lager in size, then it is more difficult to cut the pipe by hand.

**Component Description:**

Cutting Tool
Vice
Motors
Belt conveyer
Lead screw
Electronic Control Unit (ECU)

**Fabrication Process:**

The prototype model is fabricating with some manufacturing process and those few operations are described below:

**Cutting Operation:**

Cutting is a collection of processes where in material is brought to a specified geometry by removing excess material using various kinds of tooling to leave a finished part that meets specifications. We have make materials to require shape from raw materials by using cutting process. A few cutting methods of materials are described below as an images. L-angle and sheet metal has been cut by this machine for our requirements.

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Figure 1: Cutting Machine

**Welding:**

Welding is a fabrication that joins materials, usually metals or thermoplastics, by causing fusion. Here we used welding process mostly for fabrication of steel structures. So we select arc welding method of welding process in manufacturing.Arc welding is a process that is used to join metal to metal by using electricity to create enough heat to melt metal, and the melted metals when cool result in a binding of the metals.

Figure 2: Arc Welding Working Process

**Assembly Process:**

An assembly line is a manufacturing process in which the parts are added in sequence until the final assembly is produced. After fabricating the frame structures, we will assemble the components like wheel, solenoid valve, pneumatic cylinder, motor, battery by using of PU tube, connectors and wires. we have enclosed the few images of components assembling process.

Figure 3: Assembly Process

**Painting:**

Paint is one major segment of the surface coatings. The objective of painting is to form a coating film on the surface of an object in order to protect the product and give a fine appearance. Spray painting is used.

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Figure 4: Painting

**Working Principle:**

In our project, we are using a vice which is used to hold the work piece and a roller is connected with motor used to feed the work piece for the desired length when it reach the limit.A motor is connected to the lead screw which gets rotational motion when the motor is started. Another motor is connected with a cutting tool which is used to cut the work piece.When the motor starts, the lead screw move the cutting tool up for cutting the work piece.After getting to the limit, the motor is rotated in anti-clock wise and moves the cutting tool upward.This automatic operation has done by using an electronic control unit to complete the operation.

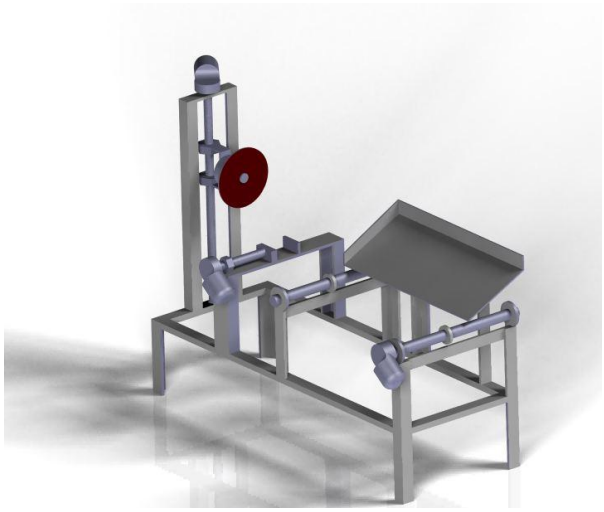

Figure 5: Product layout

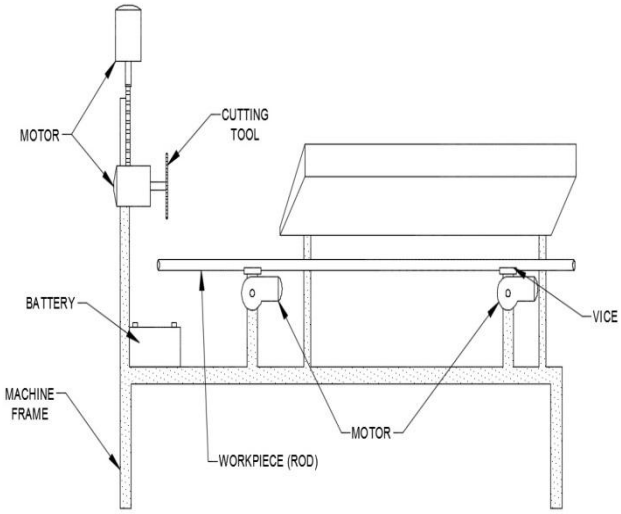


Figure 6: Product Modeling

**Product Modeling:**

This is the complete modeling of semi-automatic PVC pipe cutting and feeding machine

**Advantages:**

- No extra skill is required for operating this system.
- Easier maintenance
- Operation is very smooth and in this system we can get more output by applying less effort.
- Simple construction and additional accessories not needed.
- Comparatively cheaper in cost than the other systems.
- Continuous operation is possible without stopping.

**Conclusion:**

Cutting the pipes manually will not yield good result like low surface finish produced, low accuracy of cut etc. It is also a time consuming process. The machine developed in this project work is to cut the pipes automatically. The machine can cut the pipe with minimum burr produced around the pipe, and it is cost effective and easy to use.

**Future Scope:**

- If high torque motors are used in this project, it will cut thicker pipes and metallic pipes by using the cutter wheel.
- This semi-automatic project can be modified as fully automatic process in the following pipe feeding, clamping and cutting.

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