

DESIGN AND FABRICATION OF AUTOMATIC PVC PIPE FEED AND CUTTING MACHINE

Mohan M¹, Sathish M², Prakash R³, Kalil Rahiman M⁴

^{1,2,3}Student's Dept of Mechanical Engineering, Bannari Amman Institute of Technology, Tamilnadu, India

⁴Assistant professor (Si.G) Dept of Mechanical Engineering, Bannari Amman Institute of Technology, Tamilnadu, India

ABSTRACT:- The objective of this work is to automate the conventional power hacksaw machine in order to achieve high productivity of work-pieces than the power hacksaw machine. The automated machine the number of pieces to be cut and the length of each piece that is required to be cut. The inputs are given by with the help of a battery. The operator need not measure the length of the work-piece that is to be cut and to load and unload the work-piece from the chuck each time after a piece has been cut. The machine automatically feeds the given length of work-piece in to a chuck and starts to cut till the given number of work-pieces has been cut. which is driven by a DC motor and an IR sensor ensures that the feeding stops when the specified length has been reached. Bring about the reciprocating motion required for cutting the work-pieces. There is a electromagnetic self-weight attached with the reciprocating mechanism to provide the necessary downward force required for penetration of hacksaw blade in to the work-piece. The machine we designed and fabrication is used for cutting any shape of object like circular. According to the type of material to be cut, the cutting tool can be changed. This project gives details of pipe. This machine can be widely applied in almost all type of industries. The pipe cutting process is a main part of the all industries. Normally the cutting machine is manually hand operated one for medium and small scale industries. Automation in the modern world is inevitable. Any automatic machine aimed at the economical use of man machine, and material worth the most. The pipe cutting machine works with the help of motor. In our project small and large size pipe cutting used adjustment in various type of pipe.

KEY WORDS: Sensor, Hacksaw, Electromagnetic, Automation, Plc.

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.

- 1) Full automation.
- 2) 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. 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 pipe form according to the batch production. The selection of cutter is based on the stress calculated considering the pipe material. The material preferred in this system is a PVC (polyvinyl chloride) pipe for demonstration. But 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 will be less the accuracy of slicing or cutting of the material will also be improved. The system can be handled by semiskilled operators with ease. The layout of the machine is compact to be placed in a small workshops. 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. Now a days product are required to be production on mass scale which, ultimately reduce the production cost. For that purpose different techniques are developed. Today automation has powerfully entered in the industrial manufacturing process in order to get identical and accuracy of each production which aims at reducing the manufacturing cost of a production. Automatic pipe cutting machine is one of such machine use for mass production and aims at reducing the human involvement in order to increase the productivity and accuracy of the product. Cutting the tools or the materials of finite length by manually will not yield a good result. So we have designed and developed the system which will cut the material automatically of finite length according to our requirements. We mainly

concentrate on PVC cutting Machine for which we have designed the system. The IR sensor is placed on the PVC machine where the final output PVC comes out of the machine. The IR sensor senses the Length of the PVC and the corresponding length at that particular instant is displayed. The target length is fixed in the keypad. The IR sensor which is placed near the product senses and sends the electrical output signal. The current length is continuously displayed on the display. Now, the cutting tool cuts the PVC of finite Target length, what we desired. According to the length what we design the cutting tool, cuts the PVC automatically. This type of cutting machine can be used anywhere, where we find the application of cutting the materials of finite length automatically .it results in very accurate value. This is applicable to all type of industries.

PROBLEM STETAMENT

The common problem they are facing are cross cutting of pipes, time management , cutting time etc. the base of the pipe cutting operation is not properly fixed such that while cutting there occurs a crosscutting . The base part is hold by hands such that while cutting the pipe will move rapidly and due to that the cross cutting operation . If a pipe diameter is larger in size , then it is more difficult to cut the pipe by hand. Design and develop a prototype model showing the concept of automated pipe cutting by using a mechanical mechanism incorporating the D.C motor for required torque generation. Also fabrication the model of the same which will show automatic bar feeding.

CONSTRUCTION

COMPONETES

- Hacksaw Blade
- AC Motor
- DC Motor
- Sensor
- Crank And Slider mechanism
- PVC pipe
- Roller

COMPONENT DETAILS

Hacksaw Blade

A Hacksaw is a fine-toothed saw, originally and mainly made for cutting metal. The equivalent saw for cutting wood is usually called bow saw. Most hacksaw are hand saws with a C-shaped frame that holds a blade under tension .such hacksaws have a handle , usually a pistol

grip, with pins for attaching a narrow disposable blade. The frame may also be adjustable to accommodate blades of different sizes. A screw or other mechanism is used to put the thin blade under tension. On hacksaw, as with most frame saws, the blade can be mounted with the teeth facing toward or away from the handle resulting in cutting action on either the push or pull stroke.



HACKSAW BLADE

Standard hacksaw blade length are 10 to 12 in (250 to 300 mm). Blade can be as small as 6 in (150mm). Powered hacksaws may use large blades in a range of sizes, or small machines may use the same hand blades. The pitch of the teeth can be from fourteen -two teeth per inch (TPI) for a blade, with as few as three TPI for a large power hacksaw blade.



BLADE

DC MOTOR

A Stepper motor or step motor or stepping motor is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any position sensor for feedback (an open-loop controller), as long as the motor is carefully sized to the application in respect to torque and speed. Switched reluctance motor are very large stepping motor with a reduced pole count. And generally are closed-loop commutated.



DC MOTOR

AC MOTOR

An AC motor is an electric motor driven by an alternating current (AC). The AC motor commonly consists of two basic parts, an outside stator having coils supplied with alternating current to produce a rotating magnetic field, and an inside rotor attached to the output shaft producing a second rotating magnetic field. The rotor magnetic field may be produced by permanent magnets, reluctance saliency, or DC or AC electrical windings. common, AC linear motor operate on similar principles as rotating motors but have their stationary and moving parts arranged in a straight line configuration, producing linear motion instead of rotation.



AC MOTOR

ROLLER

A roller (sometimes called a roller) is a compactor type engineering vehicle used to compact oil, gravel, concrete or asphalt in the construction of roads and foundations. Similar rollers are used also at landfills or in agriculture. In some parts of the world, road rollers are still known colloquially as steam roller, regardless of their method of propulsion.



ROLLER

PVC PIPE

Plastic pipe is a tubular section, or hollow cylinder made of plastic. It is usually, but not necessarily, of circular cross section used mainly to convey substances which can flow liquids and gases slurries powders and masses of small solids. It can also be used for structural application hollow pipes are far stiffer per unit weight than solid members. Plastic pipework is used for the conveyance of drinking water waste water chemicals heating fluid and cooling fluids foodstuffs ultrapure liquids slurries gases compressed air and vacuum system application



PVC PIPE

SENSOR

A sensor is a device module or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics frequently a computer. A sensor is always used with other electronics. Sensors are used in everyday objects such as touch sensitive elevator buttons and lamps which dim or brighten by touching the base besides innumerable application of which most people are never aware. With advances in micromachinery and easy to use microcontroller platforms. A sensor sensitivity indicates how much the sensors output changes when the input quantity being measured change.



SENSOR

SLIDER CRANK MECHANISM

Slider crank mechanism arises when the connecting rod or coupler of a slider crank linkage becomes the ground link so the slider is connected directly to the crank. This slider crank is the form of a slider crank linkage that is often used to actuate a hinged joint in construction equipment like a crane or backhoe as well as to open and close a swinging gate or door. A slider crank is a four bar linkage that has a crank that rotates coupled to a slider that the moves along a straight line. This mechanism is composed of three important parts. The crake which is the rotating disc. The slider which slider inside the tube and the connecting rod which joint the parts together. As the slider moves to the right the connecting rod pushed the wheel round for the first 180 degree of wheel rotation.



SLIDER CRANK MDCHANISM

WORKING AND PRINCIPAL

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 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.

MERITS AND DEMERITS

MERITS

- Loading time reduce due to automation achieving faster production
- Mass production is possible with little modification.
- Easy setup.
- Can be operated with unskilled worked.
- It is portable.
- Less maintenance

High durability and reliability

Simple designs

Environmental friendly

DEMERITS

Additional cost required to do further automation

Expensive

Creating noise pollution

APPLICATION

Small and medium PVC pipe cutting industries

Works hopes

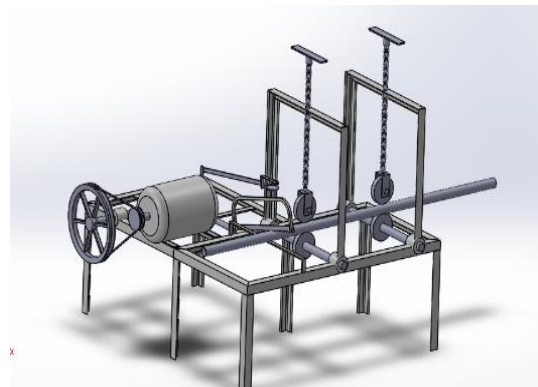
METHODOLOGY

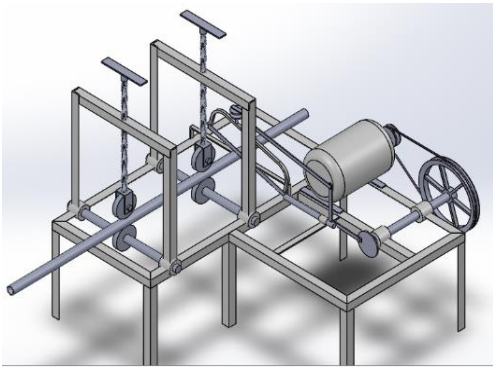
Our project design and fabrication of automatic PVC pipe feed and cutting machine bar feeding mechanism is used to feed the raw material into the machine automatically when a set of operation is finished, it consist of two set of roller one is ideal and anther is drive roller, ideal roller are used to guide the job and feed roller has a driver D.C motor this driven D.C motor has a timer, as per the time data motor will works, this timer can be adjusted as per ON timer and OFF time delay as per length of material required.

LITURATURE REVIEW

The vast review of literature will help to understand the concepts, theorems and different factors affecting the performance of machine. R.S. Khurmi, J.K. Gupta in their book “Theory of machines” (Velocities in mechanisms) helps to find Velocity diagrams of slider crank mechanism

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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.

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AUTHORS PROFILE



Mohan M received diploma in mechanical engineering in Laxminarayana Polytechnic College at dharmapuri in 2016 and currently pursuing BE Mechanical Engineering at Bannariamman Institute of Technology.



Sathish M received diploma in mechanical engineering in Laxminarayana Polytechnic College at dharmapuri in 2016 and currently pursuing BE Mechanical Engineering at Bannariamman Institute of Technology.



Prakashraj R currently pursuing BE Mechanical Engineering at Bannariamman Institute of Technology.



Lt. Dr. Kalilrahiman received the B.E. degree in Mechanical Engineering from Govt. College of Engineering. Salem in 2002 and M.Tech degree in Design and Production of Thermal Power Equipment National Institute of Technolgy, Tiruchirappalli in 2007 and PhD degree in Mechanical Engineering from Anna University in 2017. Presently working as a professor, Mechanical Engineering Department, Bannari amman Institute of Technology.