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Automatic Pipe feeding & cutting machine

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Abstract *- This paper presents Automatic pipe feeding and cutting machine. Presently in small scale industry mostly cutting is done by manually and during the cutting of any pipe material labour used to do marking of measurement but when there are linear repeated large number of pieces we have to cut at that time a lot of time required for marking purpose and after marking we load the raw material on the cutting machine and we cut the material in this problem due to interference of human lot of errors are involved also presently in the market automatic high-tech machines are available but this are not affordable for small scale industrialists .Our aim is to provide automatic pipe feeding and cutting machine with max efficiency and minimum cost*

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I. INTRODUCTION

The automation of process plays a crucial role in improving the overall productivity of industry. The main aim is to improve overall productivity by decreasing the manpower cost, utility and improving quantity and quality of production. Quality of production is improved by making the manual cutting operation fully automated ensuring the repeatability of the process with accuracy and precision. Quantity of production is improved by avoiding manual delays and achieving quick response time. It also focuses on optimum use of power provided for cutting operation. High technology machinery are available in market for pipe cutting but this machinery are not affordable for small scale industrialists. In some small scale industries pipe cutting is done manually. The process of marking is time consuming and also there are chances of errors and also more efforts are required to cut it manually. The main concern of this system is to carry out three process-Feeding, Clamping and Cutting. Benefit of this system is that we can cut the desired pipe with comfort. The sequenced processes of the system must be accurately timed. The chief work of the system is to slice out huge number of jobs in pipe form rendering to the batch production. The material favoured in this system is a PVC pipe but mild steel pipes can also be worked out by using diverse cutter provision. In automatic pipe cutting machine firstly the pipe is fed with the help of rollers, the chain and sprockets are used to transfer the motion of main roller to the guide rollers. Then clamping operation is done for proper cutting. For cutting purpose quick return mechanism is used to reduce the time of return stroke. Two motors are used, one for pipe feeding and another for operating mechanism. To perform all operations automatically sensors and Arduino is used. With the help of this system the time period required to slice the substance like pipe will be reduced. The accuracy of cutting of the material will also be enhanced. The system can be controlled and maintained by semi- skilled workers with ease. The design of machine is compact and can be placed in small workshops.

II. RELATED WORK

This paper [2] includes design and fabrication of cutting machine which is one of the principal machines in industry. Today, automation has effectively entered in the industrial manufacturing process in order to get accurate product by reducing the human involvement. The vital part in this system is the pneumatic cylinder whose task is to relocate the cutter vertically upward and downward in accordance to the pressure provided. The selection of the cylinder based on the pressure range attained from the forces eliminated for cutting the PVC material.[4]The paper is on design and fabrication of automatic PVC pipe feed and cutting machine. 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. In this pipe feeding is done with the help of rollers. Conventional hacksaw cutter is connected to slider crank mechanism.[6]In this project 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.

III. OBJECTIVE

The Objective of our project is to produce Automatic pipe feeding and cutting machine with max efficiency and minimum cost, accuracy, repeatability. This machine will reduce manpower and human error and fulfil the need of mass production is shortest possible time

IV. PROPOSED MODEL

System Overview

In our machine there will be three operations pipe feeding, clamping and cutting. We are going to use two motors one for feeding purpose and another for operating quick return mechanism In this first pipe fed with the help of rollers .Then clamping operation is done for proper cutting of pipe without vibrations. For cutting we are going to use crank and slotted lever mechanism in this cutting stroke is slower than return stroke so time is saved in return stroke. To do all operations automatically we are going to use Arduino to perform all operations automatically one after another.

Constructional features

SYSTEM DESING

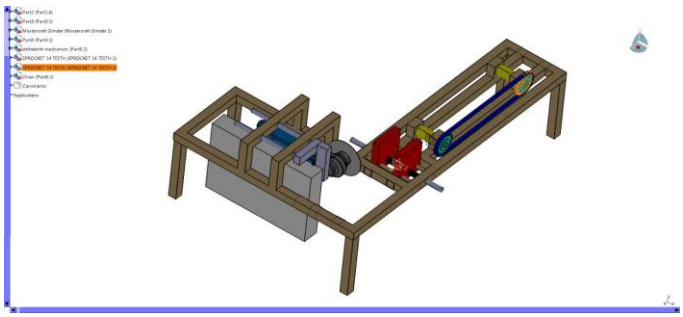

Fig: CATIA design of mechanism

1. Cutter motor and cutter head :

Cutter motor is 100 watt motor variable speed 0 to 8000 rpm with a standard 1:3 ratio gear head thus output speed of cutter will be 2600 to 0

2.Job Feeding and sensing arrangement :

For the semi-automatic version of the machine the feeding action is manual that is the job is fed in the job guide manually up to stopper. The proximity sensor is used to sense the job. The sensor then actuates the electrical circuit comprising of an electronic system.

3.Job clamping and guide arrangement:

Job is guided in the job guide whereas the clamping is achieved using a set of clamps namely the set- clamp (adjustable to accommodate different size of job) whereas the movable jaw is connected to lead screw.

4.Linear slide and cutter feed arrangement:

For cutting purpose there is crank and slotted lever mechanism .this is inversion of single slider crank mechanism. In this cutting stroke is faster than return stroke .So the time of return stroke is saved.

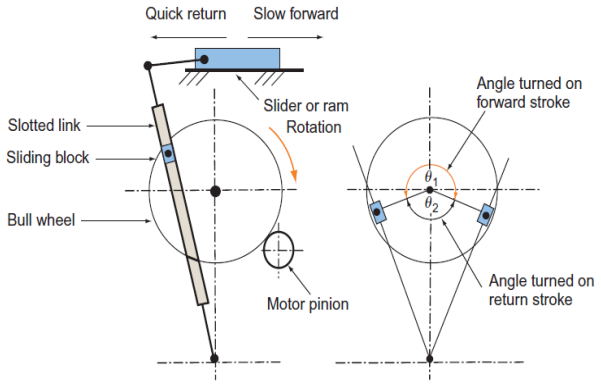

Fig: Crank and Slotted lever

Construction of quick return mechanism**:**

From below fig: In this the center of crank and end of slotted link is fixed block connected the crank slides is slotted link and the ram Crank reciprocates due to this and slotted lever mechanism is Inversion. single slider crank mechanism In this during cutting stroke crank Cover angle beta. So which is larger than alpha it take during cutting more time. stroke and during return stroke crank Cover angle alpha which is smaller so it take less time return stroke time during

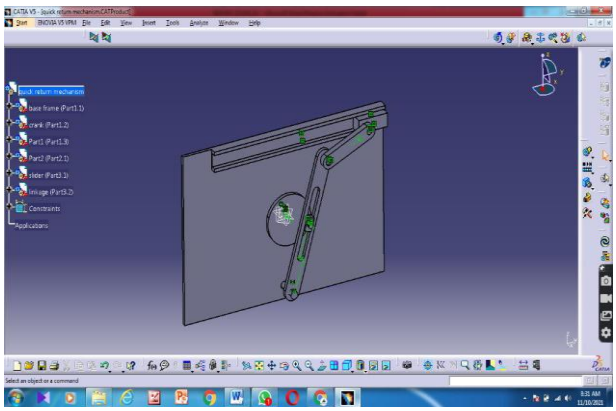

Fig: CATIA design of mechanism

V. CONCLUSION

The Automation of processes plays a crucial role in improving the overall productivity of Industry. The main aim is to improve the overall productivity by decreasing the manpower cost, utility cost and improving quality and quantity of production. Quality of production is improved by making the manual cutting operation fully automated ensuring the repeatability of the process with accuracy and precision. Quantity of production is improved by avoiding manual delays and achieve quick response time of machine. It also focuses on optimum use of power provided for cutting operation.

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