Design and Fabrication of an Autocutter for Rubber Sheet Cutting

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Abstract— The machine we have designed and fabricated is used for cutting the rubber safely by automation. Hence our project namely "Design and Fabrication of an Autocutter for Rubber Sheet Cutting". This mechanism can be widely applied in almost all tyre industries. The rubber sheet cutting is the main part of all the tyre industries. Normally the cutting is manually hand operated but our project is pneumatically operated. Automation in the modern world is inevitable. Any automatic machine aimed at the economical use of man, material and machine worth the most. In our project a hand operated valve and flow control valve is used for semi-automation. The machine works with the help of pneumatic double acting cylinder. This paper includes cutting the rubber sheet safely without causing damage to the equipment and operator.

Key words: Cutter Blade, Rubber Cutting Machine, Automation, Pneumatic Cylinder

I. INTRODUCTION

This is an era of automation where it is broadly designed as replacement of manual effort by mechanical power in all degree of automation. There are of two types of automation. i.e. Full automation and Semi-automation. In semi-automation a combination of manual effort and mechanical power required whereas in full automation human participation is totally negligible.

A. Need of Automation

Automation can be achieved through computers, hydraulics, pneumatics, robotics etc. of these sources, pneumatic form an attractive medium for low cost automation. The main advantages of all pneumatic system are economy and simplicity.

- Increase production
- Reduction of overall cost
- Reduction of fatigue
- Improved personal comfort
- Increase safety

The purpose of this project is to design and manufacture the mechanism which is used for cutting the rubber sheet safely by using pneumatic cylinder. The human effort and accident risks are totally neglected by semi-automation.

II. METHODOLOGY

This project consists of two pneumatic cylinders in which a small cylinder having 200 mm stroke length is mounted on the top of the machine and big cylinder having 950 mm stroke length is mounted horizontally on the channel. The rubber sheet which we want to cut having the maximum length of 940 mm. Therefore the big cylinder used is of 950 mm stroke length. The small cylinder is used for holding the rubber sheet. On the piston of a big cylinder the cutting tool is attached to cut the rubber sheet properly.

Linear motion track is used to avoid the unbalancing of the cutting tool which is attached to the piston and gives the proper motion to the cutting tool. The cutting tool is made up of High stainless steel material.

A. List of Components

- Pneumatic cylinder
- Cutting tool
- Square bracket
- Flow control valve
- Solenoid valve
- Quick exhaust valve
- L M Bearing
- L M Guide

III. WORKING PRINCIPLE

The rubber cutting machine works with the help of pneumatic cylinder. To carry out this operation accordingly compressed air is used carried out from the compressor. There are direction control valve and flow control valve. As the rubber sheet falling from rolling conveyor which is at the top of the machine, when the rubber sheet reaches to down on the through belt conveyor the square brackets connected with small pneumatic cylinder, the forward movement of the piston will hold the rubber sheet tightly with the help of square brackets.

The arm from the compressor enters to the air receiver tank to the flow control valve. The controlled air from the flow control valve enters to the D.C. valve. The function of D.C valves to enter the air into the pneumatic cylinder. The 5/2 D.C. valve is used. In one position air enter to the cylinder and pushes the piston is connected to the linear motion bearing along with linear motion guide rail.

The cutter is hold in cutter holder and cutter holder is attached with piston thread so that the cutting stroke is obtained. In the preceding position, piston is pulled back in reverse direction from the air entering to other side accordingly required releasing stroke is obtained.

IV. WORKING MODEL OF RUBBER SHEET CUTTING MACHINE

Fig. 1: Actual Manual Working before implementation

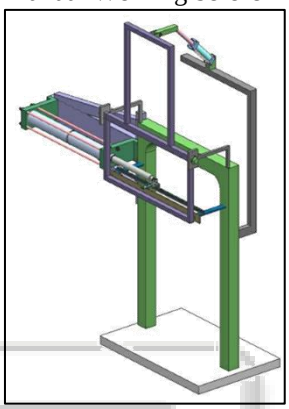

Fig. 2: 3D model of rubber sheet cutting machine

V. ADVANTAGES

- The chances of accidents are neglected. i.e. Increased in safety.
- Highly skilled operators are not required.
- Increased in production rate.
- Easy cutting of rubber sheet.
- Reduced cutting time.
- Human fatigue gets reduced.

VI. DISADVANTAGES

- High initial cost.
- Larger in size.
- Difficult to transport.
- Machine is not portable.

VII. APPLICATIONS

- This machine is very useful in tyre industries.
- This machine is used to cut the rubber sheet safely.

VIII. CONCLUSION

It is known that manual operating cutting can be replaced with automated cutting machine. The major advantages of this machine is to increase the safety and to reduce the human efforts. In this paper we have presented a design of a system based on pneumatic cylinder which is used for profile cutting in industrial purpose. This pneumatic cylinder is more efficient in working along with safety measures to avoid the accidents and easy in operation.

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