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A PATH FOR HORIZING YOUR INNOVATIVE WORK

DEVELOPMENT OF PAPER PLATE MAKING MACHINES

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Abstract: A paper plate is a plate made out of paper and often lined with plastic to prevent liquid from leaking out or soaking through the paper. The base paper for paper plates is called kraft. This kraft is coated with the thin layer of silver film. This paper is then pass through successive stages of rolling, and then gets wounded on a roller. Then it is cut for required dimensions (here 14x28 in). After then this paper of required dimensions is pass to the press machine for giving required shape of plate. The operations from taking out the roller of coated paper, cutting it for required dimensions and then transferring it to the press machine are carried out manually, our aim is to automate this operation. This project work deals with automating the above mentioned operations of manually operated paper plate making machine available at "S.M. manufacturing and trading" company at Bhandara(M.S).

Keywords: Paper plates, kraft, silver film, rolling, press machine, automation.

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INTRODUCTION

Paper plates are widely used in domestic applications instead of metal plates. These plates are found useful because they can be disposed off. These plates can be manufactured at a very low cost. Making plastic plates is a small business and one can easily afford it with the minimum investment.

Fig.1. Paper plates

2. TYPES OF PAPER PLATE MAKING MACHINES:

2.1) manual paper plate making machine:

Here the operation of paper plate making machine is carried out manually. The different operations are:

1) Making a roll of laminated kraft.

2) Withdrawal of laminated roll

3) Keeping this roll for manual cutting of sheets and cutting of sheets to the required size.

4) Making a bunch of 10 sheets and transferring this bunch to manual press machine.

5) Manual pressing of sheets.

6) Removal of sheets and extra material from the press machine manually.

2.2) semi automatic paper plate making machine:

This is a semi automatic single die paper plate making machine which required one person to operate. You have to put the sheets on work station and machine gives the finished products automatically. Machines dies will work down and up automatically.

2.3) fully automatic paper plate making machines:

This is a fully automatic single die paper plate making machine which involves no labour. You have to put the laminated roll on work station, machine takes the paper itself and gives the finished products automatically.

3) LAMINATED MACHINES:

This machine is a part of total paper plate making machine and is used for laminating the kraft from the bottom. Normally the paper is coated by the silver plastic film.

In this process the kraft rolls continuously and a plastic film from bottom sticks on it from the bottom. The plastic film passes through a glue tub before sticking to the kraft. This laminated kraft is further pass through a series of rollers and a small pressure is applied on it for complete and permanent sticking on the kraft.

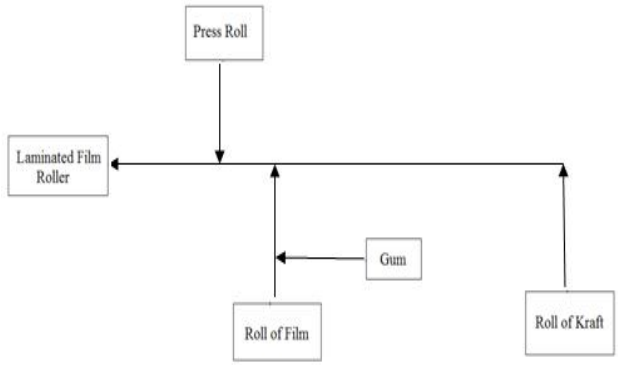

Fig 3.1.1 Line diagram of laminated machine

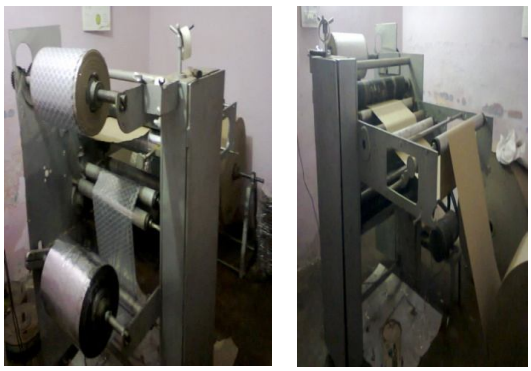

Fig 3.1.2 Images of laminated machine

4) CUTTING MACHINE:

The roll of laminated paper is then taken out and cut manually to required dimension sheets (here 14in×28in.) as shown in fig.

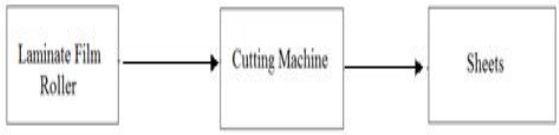

Fig 4.1.1 .Line diagram of Cutting machine

Fig.4.1.2 Image of cutting machine

5) PRESS MACHINES:

Press machine is a machine tool that changes the shape of workpiece by the application of pressure. The below figure give the line diagram of the press machine which is being use at our industry.

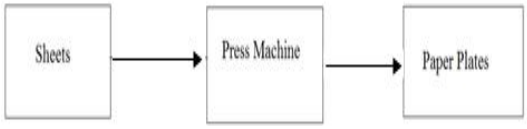

Fig 5.1.1.Line diagram of Press machine

There are different types of press machines.

i) manually operated press machine:

This machine requires one person to operate it. Figure shows a wheel type manually operated press machine, in which one person required to rotate the wheel for applying the pressure on sheets to make paper plates. The pressure required to press 10 sheets manually is 1 ton.

Fig.5.1.2.Image of manually operated press machine.

ii) hydraulic press machine:

A hydraulic press is a machine using a hydraulic cylinder to generate a compressive force.

- Liquid does not absorb any of the supplied energy.

- Capable of moving much higher loads and providing much higher forces due to the incompressibility.

- The hydraulic working fluid is basically incompressible, leading to a minimum of spring action. When hydraulic fluid flow is stopped, the slightest motion of the load releases the pressure on the load; there is no need to "bleed off" pressurized air to release the pressure on the load.

iii) pneumatic press machine:

Pneumatic systems, that are used extensively in industry, and factories, are commonly plumbed with compressed air or compressed inert gases. This is because a centrally located and electrically powered compressor.

Simplicity of design and control—Machines are easily designed using standard cylinders and other components, and operate via simple on-off control.

Reliability—Pneumatic systems generally have long operating lives and requires little maintenance. Because gas is compressible, Equipment is less subject to shock damage. Gas absorbs excessive force, whereas fluid in hydraulics directly transfers force. Compressed gas can be stored, so machines still run for a while if electrical power is lost.

Safety—there is a very low chance of fire compared to hydraulic oil. Machines are usually overloading safe.

6) PROPOSED MODEL OF PAPER PLATE MAKING MACHINE:

Proposed model of paper plate making machine is shown in following fig 6.1.

The laminated roll is taken out from the machine and kept on the first stand. At opposite end a pulling roller is kept. The function of pulling roller is to pull the laminated sheet from the die successively as soon as the punching operation completes. The punching time of machine is so adjusted that the required plate is cut within the stipulated time.

Number of rollers can be used simultaneously for punching more sheets at a time. Thus increasing production rate.

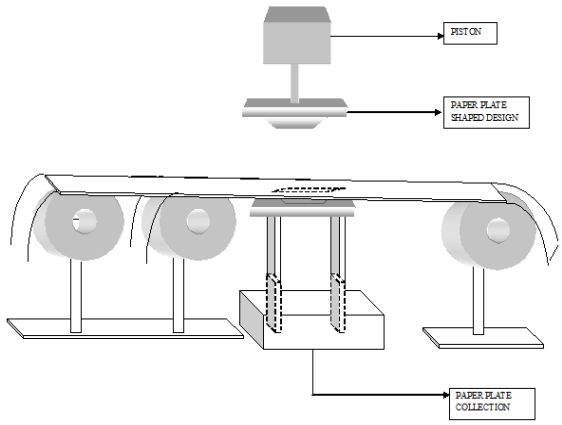

Fig.6.1. Proposed model of paper plate making machine

7) CONCLUSION:

Paper plates can be manufactured at high rate with the available machines. Manufacturing normally requires hydraulic press machines to operate at a very high speed. But the problem is that they are used for making one or two plates simultaneously, which shows a less production

rate. Therefore there may be the chances of increase in production rate by simultaneously punching the number of sheets in a single pass.

1) Possibility of increase in production rate.

2) Speed of the roller and punching is to be synchronised for cutting the plate of required length.

3) Design of Die is to be optimized for accurate punching operation.

4) Temperature control of die is the important parameter.

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