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Semi-Automatic Paper Bag Making Machine

A. Vimal[1], R. Ajith Velayudham[2], P. Deepak[3], K. Elangovan[4], W. Fredric Prem[5]
[1]*Assistant Professor, Dept. of Mechanical Engineering, Sri Eshwar College of Engineering, Coimbatore, India*
[2,3,4,5]*B.E. Student, Dept. of Mechanical Engineering, Sri Eshwar College of Engineering, Coimbatore, India*

***Abstract*: In this project we are going to manufacture paper bags making machine. As we know that government of Tamil Nadu has banned plastics, we have planned to manufacture this machine. The impact of the plastics has an adverse reaction over living beings and natural environment. It consists of paper folding system, rollers and adhesives. The mechanism used in this project is roller mechanism. In this paper an attempt has been made to design and manufacture a semi-automatic paper bag making machine.**

***Keywords*: Enter key words or phrases in alphabetical order, separated by commas.**

1. Introduction

We need small size bags every day for various purposes like grocery, fruits, and vegetables. We use plastic bags for such purposes. Plastic shopping bags kill large numbers of wildlife each year so, to avoid above harmful effects of Plastic Bags, viable alternative is required which is Paper Bag. All these problems are eliminated in the presented machine. A machine whose initial cost is less, which does not require any special paper, which can be used for small scale production, is developed. This machine will help a poor family to earn money through small scale production of paper bags. Paper bags have traditionally been presented as the eco-friendly option when compared to plastic bags. The natural fibers of paper, and the renewable resource used has a positive image, as the increase in volume of paper bags is likely to be sent to the landfill, have now taken over a new role in the recycling options which are firmly established. It has been scientifically proven that paper bags are not harmful to the environment as plastic bags.

2. Problem identification

As we know that government of Tamil Nadu has banned the usage of plastics and polythene bags because of which the demand on the paper bag is increasing. So, we have decided to make a semi - automated paper bag making machine.

3. Formulae used

CUTTER CALCULATIONS:
Area of the cutter=length*thickness
=500*0.5
=250mm^2
ROLLER CALCULATIONS:
Surface area of the roller= 3.14*d*h, where d=50mm
=3.14*50*500
=78500mm^2.
TENSILE STRENGTH CALCULATIONS:
Tensile index=Tensile strength/GSM
Tensile strength=Tensile index*GSM
=45*100
=4500N/m.
CUTTING FORCE REQUIRED:
Cutting force (F)=Shear strength* area of cutting edge of the paper.
FR=S*A*L=4500*110*10-3*0.0625
FR=28.1N.

4. Modeling

Using SolidWorks 2016, the components required for the machine is designed and assembled.

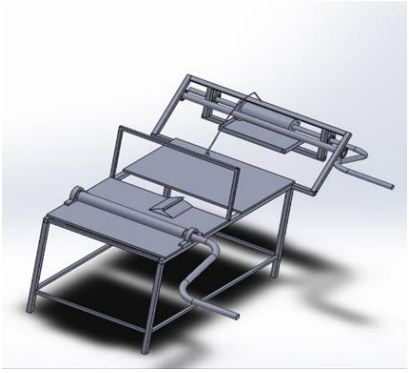

Fig. 1. 3D Model of semi-automatic paper bag making machine

Table 1
Required components and its specifications

S. No.	Components used	Specifications
1	Hollow square pipe	3/4 inch
2	PVC pipe roller	3/4 inch
3	PVC pipe roller	1 inch
4	Plummer block	3/4 inch diameter
5	Ball bearings	1 inch diameter
6	Camel glue	150 ml
7	Sheet metal tray	400 mm

5. Analysis

Analysis is done using an analysis software called ANSYS. Here the total deformation and equivalent stresses acting on the

sheet of (100GSM) paper is calculated.

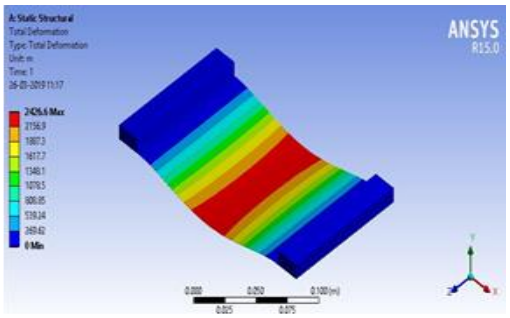

Fig. 2. Analysis for total deformation

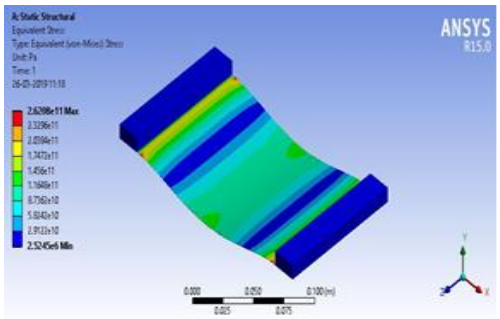

Fig. 3. Analysis for equivalent stress

6. Working

Initially, the paper from the paper roll is allowed to pass through a roller made of PVC pipe (1inch). Then the glue is applied on the paper by means of a foam sheet which is wrapped over a shuttle cork box. The box is mounted on a (3/4 inch) PVC pipe. Then the paper is allowed to pass through the paper folding system which is made up of a sheet metal. While passing through this system paper gets folded in the shape of a bag. Finally, the paper is send to final roller where the paper gets compressed and it is cut by means of the sharp edges blades made of sheet metal.

Fig. 4. A prototype of semi-automatic paper bag making machine

7. Conclusion

Thus, we have come up with a low-cost semi-automatic paper bag making machine. We have been able to design and develop a semi- automatic paper bag making machine for different objectives using simple mechanisms. Thus in this paper the attempt made for designing and manufacturing of semi-automatic paper bag making machine was successful.

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