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MANUFACTURING PAPER BAG: SEMI-AUTOMATIC

Rahul Mishra
Associate. Prof., Mechanical Engineering Department,Kalinga University, Raipur.

Abstract: We have proposed a cheap, portable Paper-bag making machine fabricated to produce paper-bags and reduce the usage of plastic bag for a green and safe enviroment. The system is semi-automatic which is capable of producing a paper bag from a paper sheets. The system can be implemented in a small scale industry for producing paper bags and it will automatically minimize the trend of plastic bags.

Key Words: Creasing, Paper Bags, Made in INDIA, PBMM, Gluing, Pneumatic Cylinders.

INTRODUCTION:

The Plastic considered as one of the greatest inventions by virtue of its use in carrying things has become a major element in polluting the environment. It is almost impossible to destroy plastic bags. Plastic bags remain in the soil for centuries, degrading the soil, preventing it from replenishing its nutrients, and rendering to barren. This ultimately results infertile land becoming barren and turning into desert. It is estimated that the life expectancy of plastic bags is around 250 to 500 years. In current situation, the use of plastic bags for every single work has become a usual thing. Right from buying grocery from market to shopping in malls everywhere plastic bag is been used. The use of plastic bags across the country has increased, and it is continuously increasing day by day.

Paper bags on the other hand, come from wood, which comes from trees, which grow in the earth's soil. The trees needed to make paper bags are considered renewable resources. Once paper is made, it can be recycled and used to create more paper goods. Bags made from paper are bio-degradable and hence highly environment friendly than plastic bags. Throughout India people make paper carry bags by hand in their homes as per the local demand. Generally, women in the family take up the paper bag business as a second source of income.

The use of paper bags is promoted nowadays. This project is based on reuse of papers for manufacturing paper bags instead of using recycled papers. It also aims on switching traditional manual method of paper bag manufacturing to low cost semi-automated system in order to achieve the goal of mass production of paper bags through automation. Due to mass production, the cost of the final bags is expected to be low as compared to the paper bags available in the market made by traditional manual method.

LITERATURE REVIEW:

N. R. Patil, Jonathan Lobo, AqueelMadki, RohitBhande, ShripadBodhankar. [1] “Automated Paper Bag Making Machine” In this research paper, they have design and develop an automated Paper bag making machine for different objectives and which integrate all the objectives together using Arduino. Compensating for the shortcomings of other already available systems, there project is feasible, high efficiency and high robustness. They have automated paper envelope machine in order to reduce the man power and to increase the efficiency and quality of the product and ultimately to increase the preparedness to face emergency situations. There system contains the parts which are easily available. Almost all the single paper folding machines currently available in the market are very much expensive. Therefore, proposed system have simple and easy mechanism which allow operator to use it easily.

Mangesh M. Daundkar, Mrs.Bhairavi N. Savan. [2] "An Optimized Embedded System for Automated Paper Bag Production" In this paper, they have used micro-controller based design approach which has kept the cost of the system significantly low as compared to PLC based designs. They have used recycled approximately A4 size which is feed into machine with the help of two rollers they have used two IR sensors one is used for applying adhesive and the second sensor is triggered which signifies that middle portion of the page is at the center of the other roller and a blade is applied to fold a paper into two halves and passed through a roller so that the glue placed on one half portion of the page gets stick to other half of the page which gives a nice half A4 size paper bag. The proposed system has required lees manpower than traditional method of manufacturing paper bags. Any kind of paper quality can be used for production whether it is virgin or recycled. Any size of paper bag can be produced by adjusting the roller length.

S. Shashank, Rajath, Nayan Kumar. V, Harish A.G, S.M. Narasimhan. [3] "Portable Paper-Bag Making Machine" In this paper, they have come up with a low-cost semi-automatic paper bag making machine. They have used Indian clone of OWI Robotic Arm, the total system cost is INR 3000. Currently their system can produce 1 paper-bag per minute. This is because of the 5V DC geared motor used in entire system. Also glue needs to be replaced frequently. Further one human assistance is required. Howe ver, the machine can be deployed in smallscale industries, homes, etc. and their paper-bag can be used for carrying vegetables and fruits, for small stationaries, can be used in medical shops for carrying medicines, etc.

ThivankaKasunGunawardena, P R Dadigamuwa and B G D AMadhusanka. [4] "Low Cost Automated Machine for Paper Gathering and Folding" they have used most of the parts in this machine are gathered from junk yards. There are thousands of machines like Photocopy machines, Printers, Roneo machines thrown out to junk yards which dealing with papers. The parts like rollers, feeders, gear wheels etc, of this machine were used from the thrown out yards. Most of the sensors used in this machine are inexpensive and simple. But they are well enough to do main tasks properly. Motors also used in this design can easily find in the junk yards or machine separating places. They can buy at low prices. Therefore, there machine is low cost as compared other machines in market. This automated system is portable and capable of working independently without much human intervention.

Subramanian SenthilkannanMuthu, Yi Li, PhD, J.Y. Hu, PhD, P.Y. Mok, PhD. [5] "Eco-Impact of Plastic and Paper Shopping Bags" This paper describes the study of the eco-impact of plastic and paper bags using the life cycle impact assessment (LCIA) technique under three different options: usage and disposal criteria with the existing usage behaviour to reuse and governmental policies to recycle, usage and disposal criteria as per consumer's perceptions if systems are in place and usage and disposal criteria in case of absence of recycling systems.The eco-impact values were plotted with and without the presence of recycling systems in China, India and Hong Kong, where the eco-impact is lesser in case of the presence of recycling systems, which enlightens the importance of the presence of recycling systems in reducing the eco-impact. Hence the consumer's behaviour and governmental policies are pivotal to plungethe environmental impacts made by these two bags. Though it is inevitable to accept certain environmental impacts until the manufacturing stage of these two bags ; further reduction of environmental impact by means of reusing the bags until they attain the last point of life entirely lies in our hands. It is mandatory to preserve our living planet and we have no choice except conserving our planet.

PremshilNagrale, AkashGaurikar, DhairyasheelGawande, NiteshKatre, Rahul Hedau, SagarRathod, KetanTonpe [6] "We have proposed a cheap, portable paper-bag making machine fabricated to produce paper-bags and reduce the usage of plastic bag for a green and safe society. The system is semi-automatic which is capable of producing a paper bag from a drawing sheets. The system can be implemented in a small scale industry for producing paper bags and it will automatically minimize the trend of plastic bags.

PROBLEM DEFINATION:

The study of above Research papers and actual visit to the paper bag manufacturing industries. We find that Bag making machines produce bags that are used to pack various types of goods in food and beverage, pharmaceutical and consumer product industries. In general, these machines are fully automatic and require operator intervention only to replenish the raw material and remove the finished products. But these machines are costly and they require papers as the raw material. These papers are strengthened by adding chemicals in order to make them bear load in the form of paper bags. Howe ver, this strengthening of recycled paper by adding chemicals creates a lot of pollution which in turn harms the environment. The major drawbacks of the existing machines are too large, occupy huge area, imported, too costly, require many people to operate, need of separate machines for creasing, folding and gluing. So the current method of manufacturing of paper bag from this recycled paper has above mentioned disadvantage which is the problem statement. Our project aims at fabrication and development of compact, low cost paper bag making machine for the mass production of carry bags from drawing sheets or used paper. The machine will be able to produce paper bags made of recycled or reused papers. The paper bag produced will be an alternative to a particular category of polythene bags usually used. The machine will be designed considering all the criteria of its realistic paper bag production.

METHODOLOGY:

As discussed above, our initial work involved designing paper bag. This project aimed at manufacturing the paper bag in large quantity. However the paper bag manufacturing unit must be compact, cheaper and should have reduced maintenance than the currently available paper bag manufacturing unit. The project followed two approach :

- Primary Approach : Primary approach involved designing the complete manufacturing setup on Dassault System CATIA V5 software. The designing of setup was done considering into account its practicality of performing operations.

- Secondary Approach : Secondary approach involved fabricating the designed setup. Complete Fabrication of project was done accroding to the operations. Each processes had certain mechanisms which followed certain sequence and transferred the product to next process of work

CAD MODEL :

1) Literature of design : - Initial survey of design was done on internet. Also actual visit to the manufacturing plant of paper bag and the construction site for idea regarding the belt conveyor was carried out. This whole thing was then clubbed to the process of designing.

2) Preliminary Design : - A preliminary design was made which was based of operations to be performed and literature study. This design was later been validated by our guide considering all the parameters. Each workstation had some mechanisms. These mechanisms were designed after intense thinking and a number of group discussions.

3) Improvements in design : - The design which was made in preliminary stage went through certain changes when fabrication process was carried out. Due to some technical reasons the component which was fabricated was changed and in turn there was a change in the design.

4) Finalized Design : - The manufacturing setup thus went through some changes in its design. And the final setup was made as per the design.

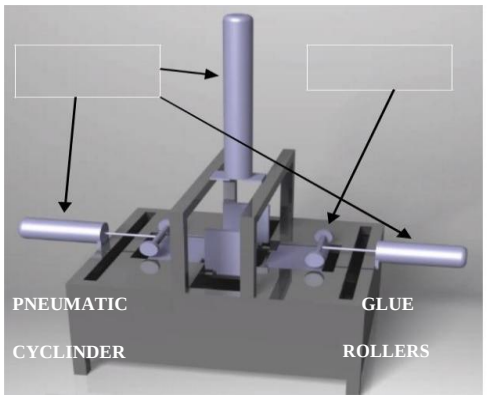

Figure 1 : CAD Model of PBMM

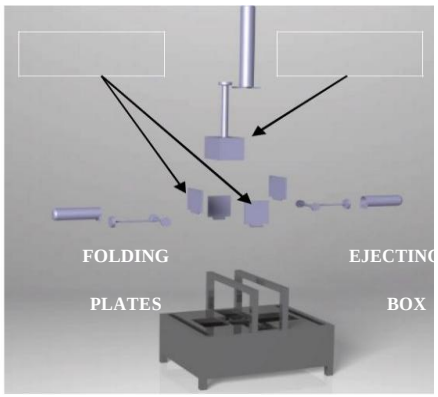

Figure 2 : Exploded View of PBMM

CONSTRUCTION:

The major components of the developed paper bag making machine shown in Figure 5.1 are frame, pneumatic cylinder, air compressor, solenoid valves. The frame is the main supporting structure upon which other components of this system were mounted. The frame is a welded structure construction from Mild steel square flange of thickness 14 gauge having sides 20mm x 20mm. dimension. The paper bag making machine comprises of five pneumatic cylinders which are connected with air compressor through pneumatic pipes and fittings. Each pneumatic cylinder is connected with the air compressor, compressor is attached to the frame which transmit pressurized air to pneumatic cylinder through pneumatic pipes and fittings. The construction of the machine comprises following parts to be assembled and fabricated:

1. Frame

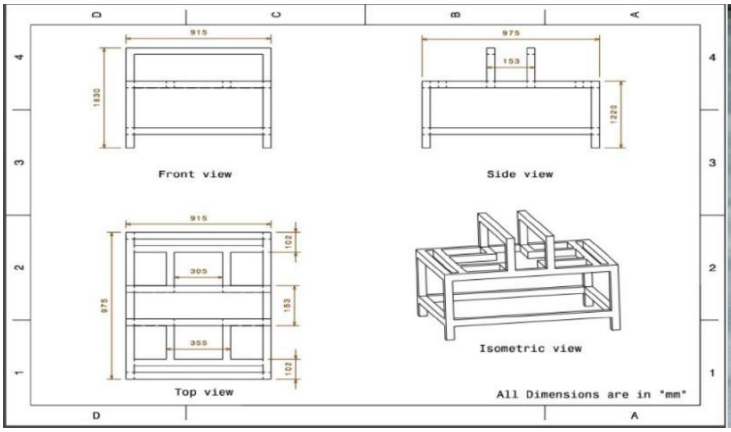

Figure 3 : Orthographic and Isometric Views of Frame

Figure 4 : Frame of PBMM

2. Compressor
3. Pneumatic cylinders
4. Nuts and bolts

WORKING:

Many believe that paper bags are more environmentally friendly than plastic bags because they are made from a renewable resource, can biodegrade, and are recyclable. Every bag paper or reusable, has an environmental impact. Paper bag consume 2.2 times more non-renewable energy than the manufacture of plastic bags, paper bag manufacture consumes 4.7 times more water, emits 3.1 more greenhouse gases and 2.7 times more acid gases than manufacture of plastic bags. Paper bags tend to have higher recycling rates than plastic bags. Post-consumer recycled paper used to carry heavy items is problematic. Many of recent paper bag making machines are very huge in size lengthy in operation and they are very costlier.

The system is designed keeping some basic objectives such as to reduce floor space, working complexity and a cheaper machine than other in market. The air tank contains the compressed air already filled. As the switch was ON, the controller stimulates the solenoid valve. The solenoid valve stem is open, the compressed air flow from the air tank to the flow control valve. The compressed air flow is controlled by the valve is called "FLOW CONTROL VALVE". This air flow is already set. Then the compressed air goes to the pneumatic cylinder. The pneumatic cylinder piston moves forward at the time of compressed air inlet to the cylinder.

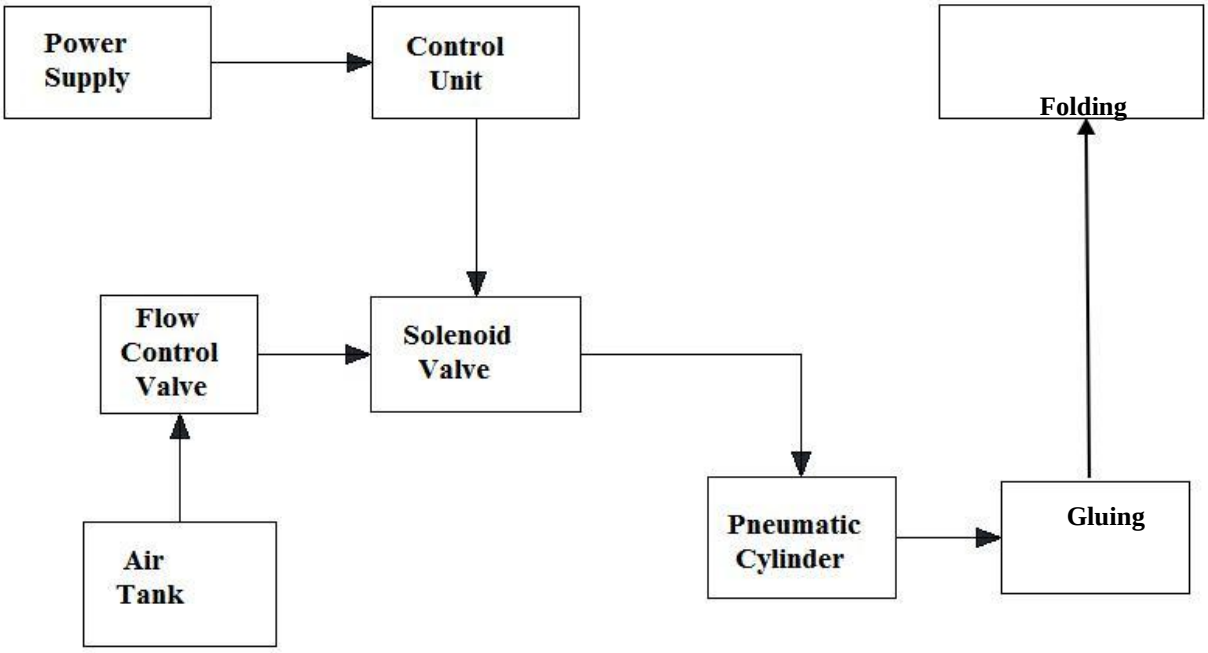

Figure 5: Block Diagram of Paper Bag Making Machine

The above block diagram shows the main components of Paper bag making machine. The power supply is required viz. electric supply for the operation of control unit, and the air power supply to operate the pneumatic cylinders. The control unit make ON the solenoid valve. These complete processes are electronic based which required electric supply. A continuous supply of air through air tank is supplied to solenoid valve. The flow control valve is used to control the flow of air which allows the air to flow in both directions. When signal from control unit receives by solenoid valve, a supply of compressed air supplied to pneumatic double acting cylinder. Then the piston takes forward motion and particular operation is performed.

CONCLUSION:

Plastic bags which harm our environment, aquatic life and human health and moreover are not degradable have paper bag as an alternative. We designed a paper bag machine which produce paper bags which will not only be eco-friendly and degradable, but also will have high load carrying capacity, and nice aesthetics. Drawing sheets which are a waste from educational institutions will be used as a raw material for manufacturing paper bag of our design. A manufacturing setup for producing our designed paper bag was fabricated. This fabricated setup used drawing sheets as raw material due to which its raw material cost got reduced. This machine is cheaper, compact and portable than currently available paper bag manufacturing machines.

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