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Paper Bag Making Machine

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Abstract: *Now a days, carry bags has become more convenient way to carry daily accessories. The well-known form of such a bag is in the form of plastic bags. Because of using such a bag plastic pollution is increasing day by day. So, to prevent the plastic pollution we are using the paper bags. Plastic bags are used on a large scale now a days by domestic users but plastic bags are less costly than plastic, cloth or other eco-friendly bags. So, for this reason our main aim is to develop a paper bag machine so that the human beings can use this bag in day to day life. The 3 D model of our project will be drawn with the help of CATIA software. All the components which are required for our project will be manufactured. The components will be collected and then the assembly will be done. The experimental testing will be carried out and then the result and conclusion will be drawn.*

Keywords: *CATIA analysis, FEA Analysis, Roller and Conveyor, Motor, Flipping Mechanism,*

I. 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 are much harmful for environmental condition for something so seemingly innocuous. Plastic bags are very harmful for environmental life as well as marine life. One of the most dramatic impacts is on marine life. So, to minimise the harmful effects of the Plastic Bags, alternative solution is required to develop which is Paper Bag. Paper Bag is used but in very small amount of scale. Some Paper Bags require special paper conditions which can increases the overall cost of Paper Bag. The costing is the main problem due to which use of Paper Bag is less. Also, Capital investment cost is very high in conventional Paper Bag Machine. So, it cannot be used for small scale production. All these problems are eliminated in the presented machine. A machine which has less initial cost, which would do require any special paper, which can be used in the small scale production rate is developed. This machine beneficial for poor family to earn money throughout small scale production of paper bags.

The paper bag can be produced from the regular size of newspaper to reduce the cost of the bag. Once the bag is used then it can be used as a scrap ,vendor earning some amount of the cost for the paper bags. Paper bags are not only reduces waste but also reduces the pollution. Even governments are trying to reduce the impact of plastic bags. This news definitely proved to be our strong hold as we are also the one who are trying to oust the plastic bags. The environmental impacts of plastic bag use include: Danger to animal life, especially when they find their way into the sea, Plastic bags are quite commonly mistaken for food by animals, especially when the bags carry food residues, are brightly coloured or are animated by the movement of water. To reduce the plastic pollution in the environment and make the environment eco-friendly we are developing paper bag machine. Plastic bags are typically used for a short period of time but take hundreds of years to break down in landfill. While plastic bags can be recycled, only a small proportion of plastic bags are collected and recycle.

A great variety of animals, land and especially marine, can choke to death on bags, experiencing much pain and distress. If swallowed whole, animals may not be able to digest real food and die a slow death from starvation or infection. Pacific Trash Vortex: The amount of floating plastics in the world's oceans is increasing dramatically.

The global warming is increases day by day and now it has become a difficult challenge to living things forms due to the very bad fact that each nation is trying to develop their countries without taking into consideration of hazardous environmental impact of degradation and pollution of various fields like water, soil, air, agricultural . More and more industries are being continuously established and hazardous chemicals and materials are being used during production process. People are using plastic bags, which are environmentally hazardous products, for their daily use mainly for main purposes like shopping, medical, glossary as result of which, the environment and agricultural lands are getting polluted. Paper bags have been presented in this paper industries as the eco friendly option as compared to plastic bags.

II. Working of Paper Bag Making Machine

II.1 CATIA Model of Paper Bag Making Machine:

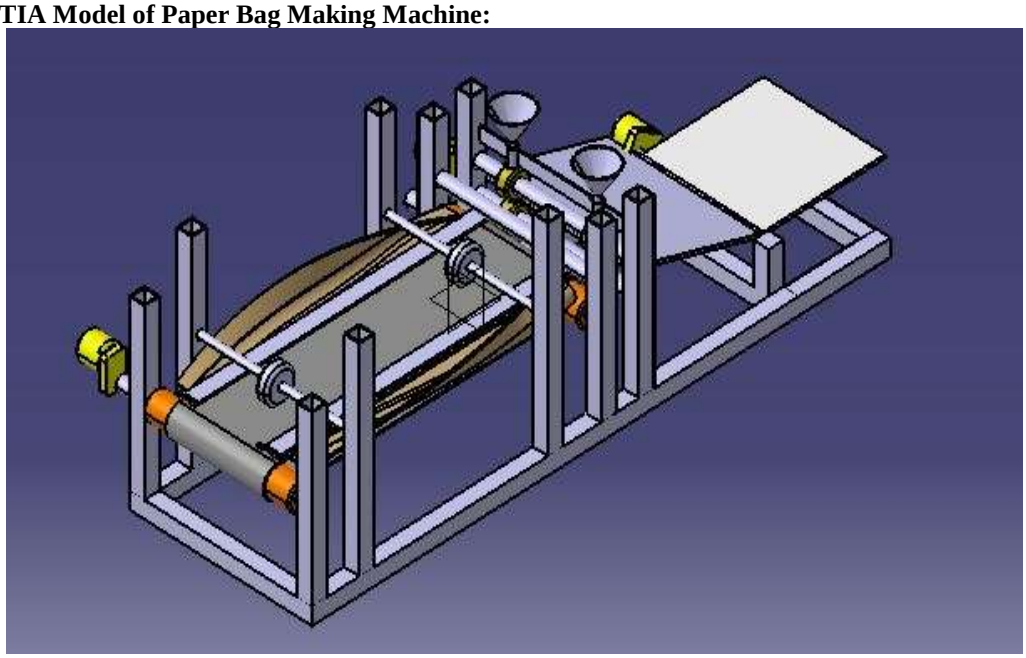


Fig 1.**Paper Bag Making Machine**

Working of paper bag is starting from the feeding of paper and then paper is folded with help of folding mechanism. After that Paper is pass towards the gluing Mechanism where glue is falling from hopper where glue stick to the paper and then the paper is flow towards the flipping mechanism. In flipping mechanism the paper is fold by using Gear motor mechanism

II.2 Major Parts of Paper Bag Making Machine

Roller And Conveyor

Fig.2 Roller And Conveyor

Rollers And Conveyor are used for carrying the load or material from one place to another. In this mechanism we used this roller and Conveyor for flowing the paper from initial stage to the final stage. The rollers allow weight to be conveyed as they reduce the amount of friction generated from the heavier loading on the belting Belt conveyors are the most commonly used powered conveyors because they are the most unique and the least in cost. Paper is conveyed directly on the belt so that both irregular and regular shaped or objects, small and large, light or heavy, can be pass successfully. These conveyors should use only the highest quality premium belting products, which reduces belt stretch and results in less maintenance for tension adjustments. Belt conveyors can be used to transfer product in a systematic manner or through changes in direction. In certain applications they can be used for static accumulation or cartons.

Electrical Motor

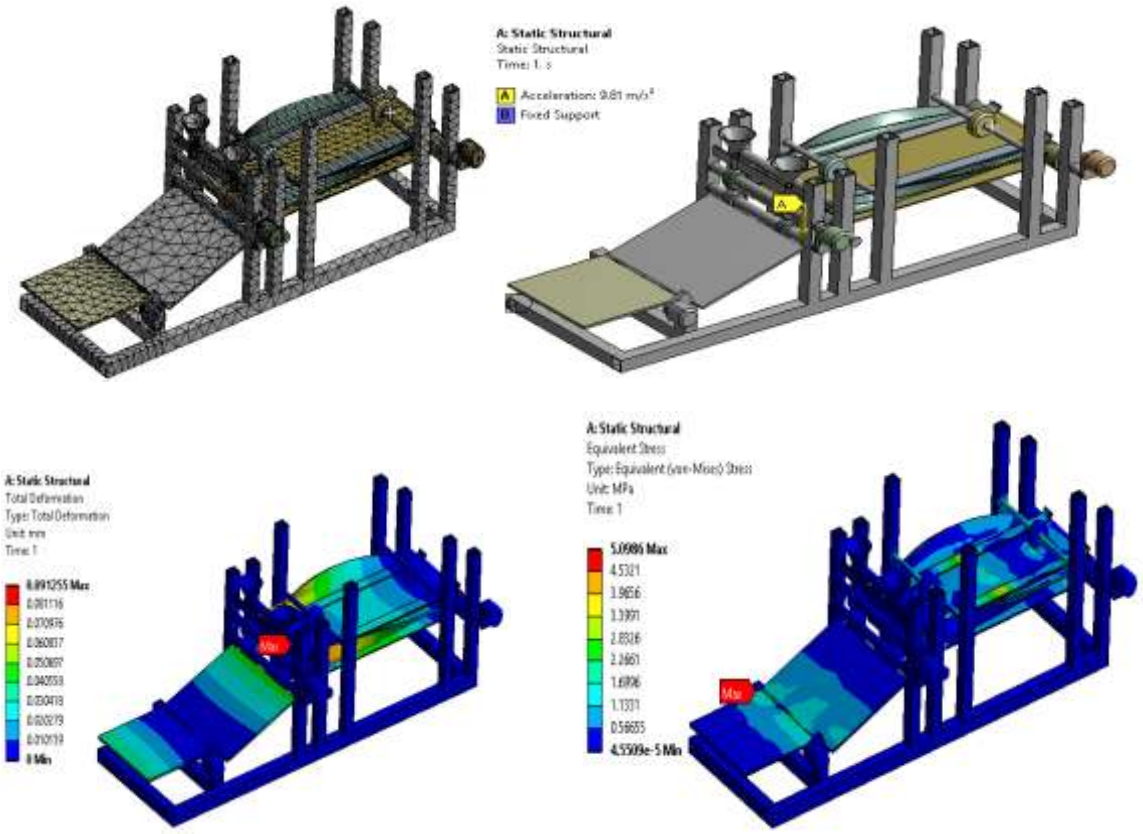
Fig3 DC Motor

Fig4 AC Motor

Motor is an electrical device that converts electrical energy into mechanical energy. Most of the electric motors operate throughout the interface between the motor's magnification and winding currents to produce the torque in the rotation form. Electric motors can be operated by direct current (DC) sources, such as batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy (such as from flowing water) and converting this mechanical energy into electrical energy.

Electric motors may be classified by the source such as type of power source, construction, application, according to phases and type of motion output. In the addition to AC and DC types, motors can be brushed or brushless, may be of various phase (see single-phase, two-phase, or three-phase), or might be either air-cooled or liquid-cooled. General-purpose motors with specific dimensions and characteristics are providing convenient to produce the mechanical power as per industrial use. The large size electric motors are used for the ship propulsion, pipeline compression and pumped-storage applications with ratings reaching 100 megawatts. Electric motors are found in industrial fans, blowers and pumps, machine tools, domestic appliances, power tools and disk drives. Small motors may be found in electric watches.

III. Design Analysis



ANSYS Meshing is a general-purpose, intelligent, highly automated high-performance product software. It can produces the most appropriate mesh for accurate, effective Metaphysics solutions. A meshing is well suitable for a specific analysis and can be generated with single mouse click for all purpose in a model. Full controls over the options used for generate the mesh which is available for the intelligent user who wants to accurate it. The power of parallel processing is automatically used for the time saving, you have to wait for mesh generation.

Creating the most suitable mesh is the engineering simulations. ANSYS Meshing is aware of the type of appropriate solutions that can be used in the project and has the appropriate criteria to create the best suited mesh data. ANSYS Meshing is automatically interface with each problem solver within the software called ANSYS Workbench environment. For a quick analysis and for the new and infrequent user, a suitable mesh can be created with one click of the mouse in the software. ANSYS Meshing chooses the most adequate options based on the analysis type or the geometry of the physical model. Especially useful is the ability of ANSYS software is to meshing automatically take the advantage of the available cores in the computer system to use the parallel processing and thus significantly reduce the time to form a mesh. Parallel meshing is available without any additional cost or license requirements and it is affordable.

Boundary Condition

A boundary condition for the model is the setting of the known value for a displacement and an associated with load. For a particular node type you can set either the proper load or the specific displacement but not both.

The main types of loading parameter available in FEA software include area, displacement, deformation, force, pressure and temperature. These can be applied to points to point, surfaces, edges, nodes and elements or remotely offset from a feature. The way that the model is constrained can significantly affect the results and requires special consideration. Over or under constrained models can give stress that is so inaccurate that it is worthless to the engineer. In an ideal world command we could have large assemblies of elements that are all connected to each other with the contact element surface but this is beyond the plan, budget and resource of most user. Which can however, use the computer hardware we have available data to its full potential and this means understanding how to apply realistic boundary conditions.

Equivalent Stress

Equivalent stress is related to principal stresses by the equation:

$$\sigma_e = \left[\frac{(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2}{2} \right]^{1/2}$$

Equivalent stress (called *von Mises stress*) is most used during design work because it will allows any arbitrary three-dimensional stress state to be presented as a single positive stress value. Equivalent stress is the part of the maximum equivalent stress failure theory used to predict yield stress in a ductile material.

$$\varepsilon_e = \frac{1}{1+\nu} \left(\frac{1}{2} \left[(\varepsilon_1 - \varepsilon_2)^2 + (\varepsilon_2 - \varepsilon_3)^2 + (\varepsilon_3 - \varepsilon_1)^2 \right] \right)^{\frac{1}{2}}$$

CALCULATIONS:
MOTOR:
Voltage = V = 12V
Current = I = 5Amp
Speed = N = 30 RPM

Power = P =V*I = 12*5 = 60W

$P = \frac{2*\pi*N*T}{60}$

$60 = \frac{2*\pi*30*T}{60}$

T = 19.09 Nm

1. BELT &ROLLER:
Considering the diameter of Roller as per our consideration
D_1 = 42mm, D_2= 42mm, N_1 =30rpm
We know that, $D_1/ D_2 = N_2/ N_1$
N_2 = 30rpm
Consider, C = 580mm

We know that, $\alpha = \sin^{-1}(r_1 - r_2/C)$
$\alpha = 0$
$\theta = 180 - 2* \alpha = 180$

We know that T_1 = Tension on tight side
T_2 = Tension on slack side
μ = Coefficient of friction for rubber belt = 0.3
β = Deep Groove Angle= 40 …From page no. 13.14V.B.Bhandari

We know that,
$T_1/ T_2 = e^{(\mu\theta/\sin\beta)}$
= 4.33
$T_1 = 4.33\ T_2$

$P = (T_1 - T_2) * V$
Where $V = \pi*D*N/60 = 0.066$m/s
$60 = (4.33\ T_2 - T_2) *0.066$
T_2 = 273N
T_1 = 1182.09N

IV. Conclusion

The paper bag machine is developed. This machine is used to make the paper bags having good quality so that it will diminish the use of all types of plastic bags. This reduces the efforts & also reduces the time. From the Analysis result, it is clear that the equivalent stress value is less than that of the Yield strength of the material so, it is clear that the design is safe.

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