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Electro-Pneumatic Disposable Plate Making Machine

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Abstract: ***Disposal plates which have got one of huge demand and market available in different sizes, shapes, pattern, raw materials etc. has gained popularity in recent decades due to its ecofriendly, biodegradable, recyclable nature and available in quality and quantities. Many machines have evolved in recent years with their importance and demand with difference in cost due to its performances. Many industries can afford this machines and gain efficient profit which cannot be in the case of small wagers or daily wagers wanting to start the small businesses cannot afford high end machines which is of high cost and if the lost cost machines are purchased then quality is low and time consumption will be high hence cannot make efficient profit out of work, hence the machine with high quality , electro-pneumatic actuated and affordable at low cost can make them a efficient profit is what our project is all about manufacturing a high quality, electro-pneumatic operated and of low cost availability is main agenda of our project.***

Keywords: Disposal plates, electro-pneumatic, affordable, quality, quantities, low cost.

I. INTRODUCTION

Paper plates are one of the most demanding products available in the market with different shape, size and raw materials many of the street side food shops, many restaurant, functions, occasional events etc , afford paper plates and demand is also high enough around the world and market will also be specified in upcoming sheets . Metal plates are being replaced by paper plates in many domestic applications. These plates can be disposed off, and they are produced at a very low cost. Paper plates are an alternative to steel, glass, and ceramic plates that we frequently use in our daily lives. Making plastic plates is a small business that anyone can afford with a minimal investment .Paper plates are mainly used as alternatives or specific uses rather than being the primary material. In India, paper plates hold great prominence because of their large scale usage. If you are planning to start paper plate making business then this is absolutely right time to kick start your business. Plate manufacturing is a rapidly growing industry in India, and the profit margin is also very high. Many types of machines available in market at different cost which can be only affordable by industries and many daily wagers wanting start small businesses cannot afford such an high end product with high cost , hence it should be made affordable to such people at better cost and quality product. Disposal paper plate nowadays gaining lot of popularity due to it's eco friendly nature , biodegradable substances used as raw materials etc before also the Market was high enough and now due to on going pandemic situation in the world made it's market grow even more high enough and it's serving its purpose. Let's also look on too some of the different kinds of machine available in market and it's importance.

II. METHODOLOGY

In this plate making machine there's a pneumatic cylinder which may be a pneumatic device a punch, die, screw rod, top plate, bottom plate, direction control valve, connectors and hoses. A compressor supplies high air to the cylinder, whose flow is controlled by a flow control valve. The air passes through a direction control valve. this is often wont to actuate the piston and to specify its direction of movement. The piston is connected to a ram. At the top of the ram punch is fastened. The die within the ram are often replaced. The piston, ram and punch are the moving parts during this machine. The die is fixed on the bottom of the machine by screw rods. the peak of the bottom are often adjusted by rotating the screw rod. the entire unit is fixed on the column. When the air flows through the flow control valve, its volume is restricted to the required amount. Then the direction control valves control a part of cylinder .

When it occupies part A of the cylinder, it moves the ram downwards alongside the punch. The punch, punches the paper kept over the die. The paper is going to be wet. To recover the wetness and make the form stable a heating coil is placed within the die. Next, direction control valves are actuated which makes the air to flow partially B of cylinder. thanks to air partially A is released to the atmosphere by a valve. This makes the punch to maneuver upwards.

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The cup is often taken out and therefore the next paper is often placed over the die for subsequent cycle. Likewise give above it actuates during a two cycle wherein first the compressor pressurized air is drawn into the DCV through which the pneumatic cylinder is forced right down to press the plate in conjunction with of the die which is connected to the present cylinder given a heater which can be helpful in removing the moisture content of the merchandise and also to retracted with the form provided then the die is full back by releasing the pressure of the port to atmosphere.

III. MODELING

In order to build any model, there should be a proper planning, print or reference of it to create the model in our project we have come up with the build through below two steps as show.

A. Initial Block Model Of The Project

The first step of our project or our visual of our model was done through a block diagram, where this blocks where name some important aspects on it related to the model then it was sketched roughly one to the paper in order to give it some reference looks to it.

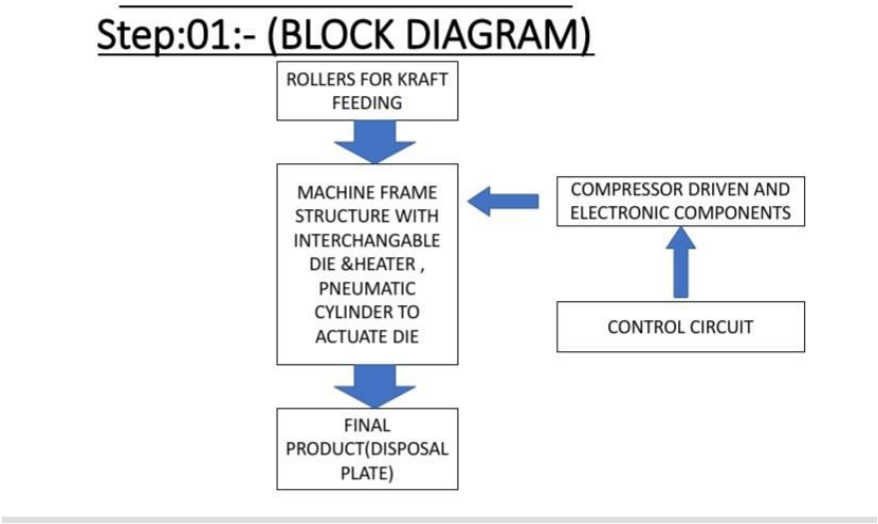


Figure 1:- Block reference model.

B. 2d And 3d Actual Design Of Product With Dimension

Next was to create our reference model through a Computer software named CATIA in which this reference model with proper dimension was made in order to be helpful for further process si h as fabrication with proper dimension given to the model.

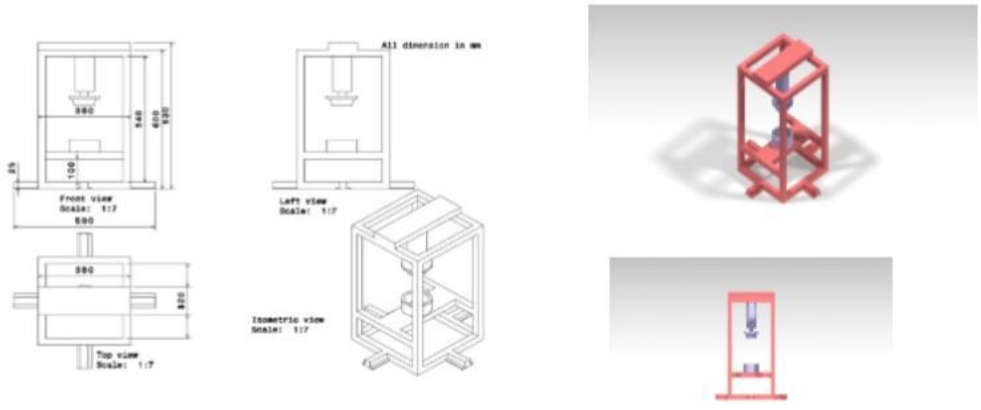


Figure 2:-2D and 3D reference model.

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IV. RESULTS AND DISCUSSION

A. Body Structure

Material:-MILD STEEL (Height:- 630 , width:-380,lenght(top) :-380, lenght(bottom) :-580, die stand :- 100 , support at bottom :- provided on all four sides (Length:-100, height:-25) all dimension in mm.

It is built of using MILD STEEL MATERIAL due to it's added advantages, cost effective and easily available in our project we have used Hollow mild steel rectangular frames to build the all four corners support, Top and base cover with the M.S rectangular plate with the die fixture solid base provided at bottom and up it's cylinder fixtures provided required quantity of Threaded fastners with variable dimension (2, 4, 6 e.t.c) are provided for the places required for temporary fixtures. Fabrication process is done use Arc welding for the built of our project.

B. Fabrication Process

ARC WELDING is used to fabricate the project.

C. DIES

Dies are of available as male and female part with the dimension (5, 6,7,8 e.t.c) in our project die used is of 5inch with provided removable and replaceable techniques for the flexibility of the operation the female part will be provided with the spring actuated pop up like small bit to push or pop out the product.

D. Electrical Elements

Major requirements for the electrical components is electricity, in our project we are providing with the heaters around both part of dies in order to remove the moisture content in the paper (Kraft) if any, Heat regulator box is provided in order to control the heat flow to the heater, Power panel to convert 220 volts to 40volts to regulate the flow of voltage to the circuit box and electric wires, plug are provided as the connectors.

E. Pneumatic Elements

1) Major component of the project is pneumatic cylinder is used to actuate the dies with the compressed air provided by compressor. In our project the cylinder use of specifications 160mm stroke and 50mm bore .

2) DCV is the another component used to regulate the flow and direction into cylinder ports and The DCV used us of 4ports 2way (4/2) DCV.

3) Another important and major requirement of our project was compressed air which is to actuate the cylinder in turn die , Hence compressor is used in order to generate the flow to make our model into working model. The compressor used is of the specifications 1hp motor ,15 Lts tank capacity ,Max 6bar pressure 2850rpm ,165lts /min air displacement.

F. Other Elements

Apart from above elements or component the body structure is coated with powder coated paint, The disposable material used is known as Kraft which is a aluminum foil laminated paper and other similar can be used.

Right from conceptual model with block reference, then converting it into proper dimensioned model for the build, surveys that's we conducted in order to know the dos and don'ts in our project, reference articles, blogs surveyed notable guidelines, provided by the guide, selection of materials, purchasing of components, fabricating keeping all potential concerns in our mind bringing out the working model i.e.

Our project titled electro-pneumatic disposable plate making machine comprising of above elements with the mentioned specifications have been finished and our potential concerns have been met.

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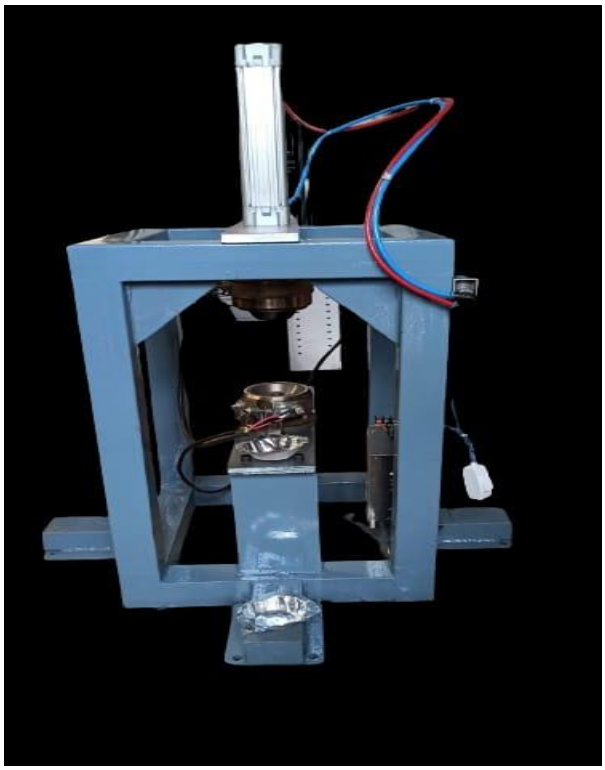


Figure 3 :- final model

V. CONCLUSION

With the available machines, paper plates can be produced at a high rate. Manufacturing normally requires hydraulic press machines to operate at a very high speed with also large in size because of the components, not much cost effective, maintenance is the major problem but the problem is that it's very tedious build. Hence irrespective of the machine in innovative world we wanted to bring up our project based on the system and potential concerns we had, therefore there may be the chances of increase in production rate by simultaneously punching the number of sheets Possibility of increase in production rate, Die is to be optimized for accurate punching operation, Temperature control of die is the important parameter. Apart from all above parameters concerns was about to bring the cost effective, low maintenance, less floor space requirement and easily affordable to the people who can gain maximum out of it. Henceforth we concluded our project on the electro-pneumatic system we used to bring up the working model onto this real world with all potential concerns and major requirements met.

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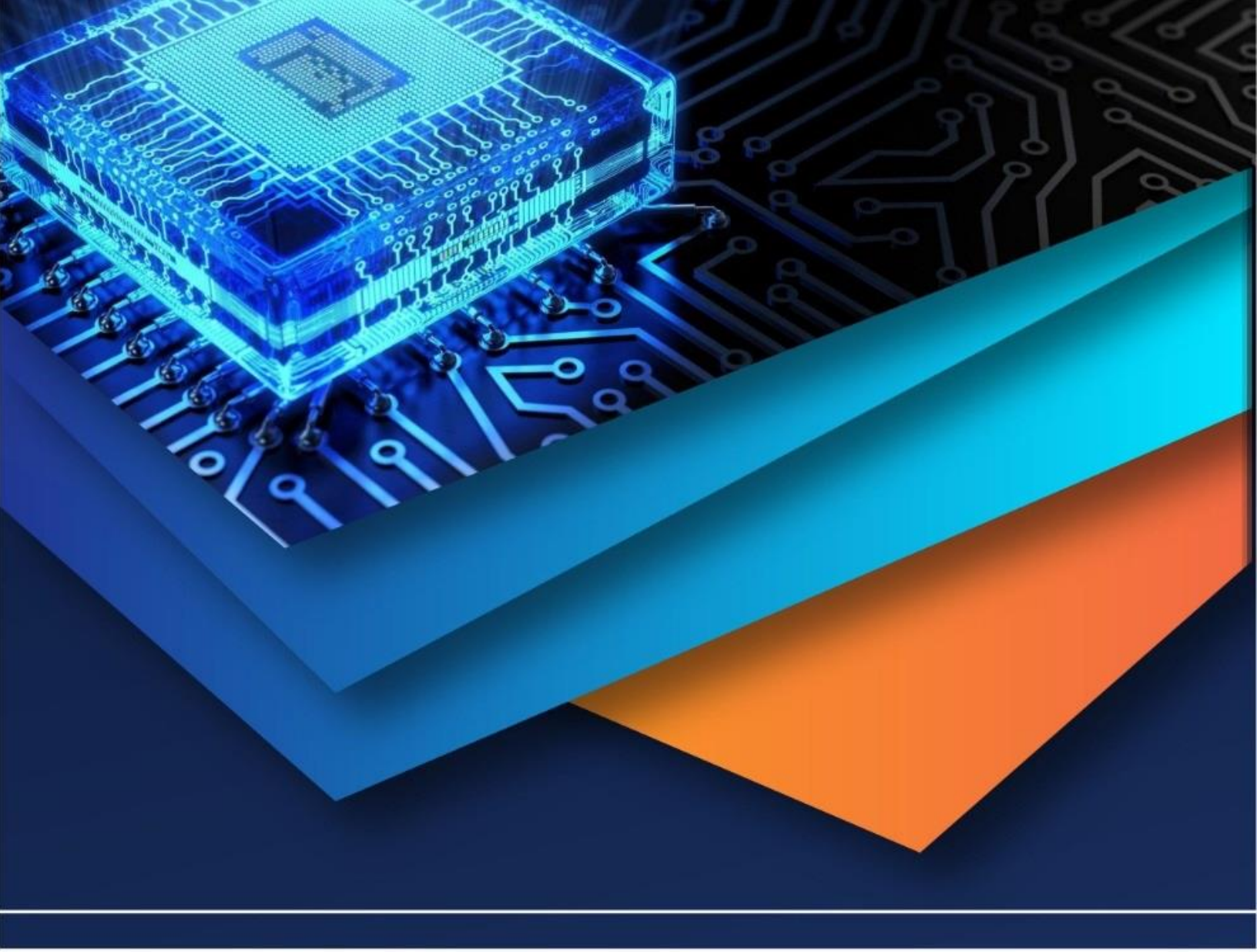
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