Effort towards Design and Fabrication of Injection Moulding Machine for Plastic Recycling

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Abstract--The main objective of this paper is to study the plastic injection moulding machine, how can it help to recycle and reuse and reduce plastic waste upto most social and economical purpose.The machine was assembled, well designed, constructed and tested. Basically the injection moulding machine is use to recycle and reuse the plastic. In this the binders and flux which is inserted in hopper is well mixed each other by the help of screw, after mixing in screw the mixture is then well heated at certain temperature and is thrown out by the pressure exerted by screw and gravity.in this project we have to tell you that the injection moulding process is the best method to recycle and reuse the plastic. The constructed injection moulding machine is use to make the paver blocks. So keep recycle and reuse of plastic to make other useful things to save your country from the big menace of plastic waste.

Keywords— Design, Fabrication, injection, Plastic waste, recycling, moulding.

I. *Introduction*

This project is basically about the recycle and reuse of plastic with the help of injection moulding machine. The term injection means to press, in other words the injection moulding machine is known as the presses it means to inject or to press. Mainly the pressing of binders and flux is done with the help of injection moulding machine. The components of the injection moulding machine are hopper, a screw type plunger and a heater. In injection moulding process mould is form by injecting molten material that's why the process is known as manufacturing process. The material is first fed then mixes using a helical shaped screw, and forced into a mould cavity. The process is mainly done on the metals, glasses, elastomers, confections and most of the times on thermosetting and thermoplastic polymers. The applications of the injection moulding process is to make paver blocks. Liu, S. J.et.al proposed that the manufacturing of thermoplastic composites with the help of injection moulding technology. They studied it by some parameters based on water. Such as water temperature, water pressure, delay time etc. Oktem, H.et.al have successful revelled for get to know us the surface roughness in end milling for the development of injection moulding with the help of ANN and Genetic algorithm. Raos, P. et.al successfully develops two parameters which are processing parameters namely as injection velocity and injection pressure which are effect on injection moulded plastic moulded part. Islam, A.et.al have studied holding factor effect on tensile strength of metal injection moulding part.

II. OBJECTIVES OF THE STUDY

- The main objectives of the project are,
- To reduce the solid plastic waste.
- To modify the design of recycling machines.
- Controlling the plastic waste on the environment.
- Making our environment an eco-friendly.

III. PROBLEM DEFINATION

In recent time, the amount of plastic is used on large scale since plastic is non-degradable, recycling plastic is one most important steps to make it useful, so in order to make reuse of plastic, Nowadays an use of plastic is increased day by day, and we know plastic is degradable in the environment and remains on the earth permanently which is dangerous to the environment but the low cost, more availability, no rusting problems, light weight etc. make impossible to stop use of it. So to make again use of plastic this recycling processes are arise. One of the most and best processes to recycle and reuse of plastic are injection moulding machine and extrusion method.

IV. WORKING METHODOLOGY:

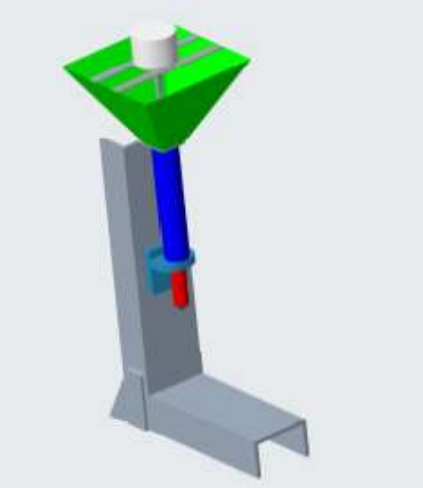
1. LITERATURE SURVEY
2. PROBLEM DEFINATION
3. DESIGN OF SYSTEM AND COMPONENTS
4. 3D MODEL/CAD
5. SELECTION OF MATERIALS AND COMPONENTS
6. FABRICATION OF THE SYSTEM AND SETUP COMPONENTS
7. TESTING

DESIGN OF THE SYSTEM:

Basically design of the injection moulding machine is designed in a solid works software along with which we can able to construct the 3D model or CAD of the material. All the work were precisely done by us. Along with which the mechanical design were nicely handle by us. Mainly the design is done in two type's viz. design of the components and other is mechanical design of the components.

The main components of injection moulding machine are hopper, screw, heater, cylinder, and c-channel frame. All the components were do their work properly. The injection moulding machine were work properly with this components. Now consider the 3D model construct below.

3D MODEL:



V.DESIGN OF THE COMPONENTS

Main components of the injection moulding machine are hopper, screw, heater, cylinder, c-channel frame.

HOPPER:
Hopper is made from steel sheet metal which is 1.5 mm thick. The material will be fed through the hopper.

SCREW:
The screw consists of a helical surface surrounding a central cylindrical shaft inside a hollow pipe. The screw mixes the binders and flux and pass it towards the heater of the cylinder.

HEATER:
The heater is the component which converts the electrical energy into heat energy. The heater used in the injection moulding machine is use to increase the temperature, due to increase in temperature the material is heats properly and give suitable output.

CYLINDER:
The vertical cylinder is placed having height of 110 mm. whatever material mixes by the screw is then passes to the hollow vertical cylinder. In which the material heats with the help of heater surrounded on the cylinder.

C-CHANNEL FRAME:
The main frame of the machine was constructed from 30 x 30 x 3mm angle iron bar, which provides support for the other units.

V. BINDERS

Binders are used to hold the other constutents together during Manufacturing.If we use binders of low molecular weight,then plastic can be mold easily and vice versa.Normally,using binders are Cement,Water,Sand,etc

VI. LIMITATIONS OF THE PROJECT:

The main limitation of injection moulding machine is It's very high initial start-up cost.

Once the binders and flux are fed to the hopper of the machine. Those only can out for the process of moulding which means continuous feeding is not allowable

VII. RESULTS AND CONCLUSIONS

Finally we can recycle the plastic flux with the combination of binder to make paver blocks. With the help of the shredder machine the flux is collected and inserted to hopper of injection moulding machine. The binder is also inserted in it and the desired output is obtained after heating. Sometimes plastic recycling is refers to useful product and it efficient for waste management also. But a small amount of plastic recycling is done in small quantity so we think about the large quantity of the output.The output from the injection moulding should be suitable for paver block making and the properties should be as similar as paver block properties. This results were achieved.

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