

FABRICATION OF PLASTIC TILE MOULDING MACHINE

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Abstract

Population growth and rising living standards as a result of technological advance have contributed to an increase in the amount of solid waste produced by industry, domestic and agricultural waste activities. In today's lifestyle, we can see plastics everywhere like toys, water bottles, polythene bags and etc. The waste generated by plastic is huge and waste disposal is highly challenging. To overcome this problem of waste management and to protect environment, aquatic life etc. affected by plastic waste we are using those plastic in an effective manner by reuse and recycling it into a floor tile which is environmentally and economically sustainable. The use of solid waste in construction material is such an innovative and making of floor tiles is attractive way of using plastic waste. Plastic tiles absorb less water compared to traditional tiles. This is an efficient and effective way to reduce solid waste management.

1. INTRODUCTION

Plastic is a hazardous substance creating very serious problem in today's world which doesn't degrade naturally and difficult to decompose. The properties of plastic are very unique and it can mix with every kind of material. Plastic is a composition of synthetic and semi synthetic organic compounds. They are malleable and ductile and remould into any solid substance.

Nowadays, use of plastic items in our day-to-day life is common such as polythene bags, disposals, furniture's, packing food packets and other accessories and after being used it will throw out in public places or into any water streams. This will affect the aquatic life and as well as it reduces the fertility of soil.

Plastics are of varieties of types classified based on their chemical composition and nature of recycling properties.

1. Polyethylene Terephthalate Plastic (PET or Polyester)
2. High Density Polyethylene plastic (HDPE)
3. Polyvinyl Chloride Plastic (PVC)
4. Low Density Polyethylene Plastic (LDPE)
5. Polypropylene plastic (PP)
6. Polystyrene Plastic (PS)
7. Other Plastics

These plastics are grouped according to their recycling number. That is, when you take any plastic material, inside the recycling symbol you'll find a number as shown in figure 1.1.1. That is the recycling number. It basically tells you that what type of plastic material they are and their melting temperature differs based on that number.

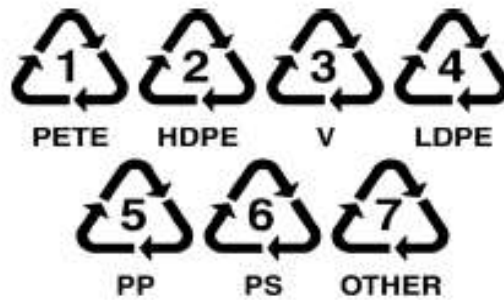


Fig 1: Types of Plastic.

Plastic can be reused in various sectors like marketing, manufacturing, transportation etc. In construction sector, we can use the plastic waste on plastic is a very useful substance in our daily life work, but after the use of plastic it is very difficult for us to dispose of it because it is a non- biodegradable substance.

2. WORKING PRINCIPAL

In this project, we are going to fabricate tile from plastic waste for that we need plastic as a raw material.

The first step in this process is to collect plastic waste generated and carryout segregation to obtain plastics suitable for the process. Then the plastics selected for the process is washed with water to remove dust particles and later it allowed to dry naturally in air. The cleaned plastic is then shredded into small pieces. Simultaneously, a mould cavity of required shape and size (say 10cm X 10cm) is prepared. A support structure made up of MS Sheet metal is provided at the centre of the frame in which the whole heating element setup is mounted to the rear side of it. At the top, a plate with dead weight is provided to facilitate vertical movement.

Now, the shredded plastic is filled into the mould cavity supported over the support structure or plate, to that heating element is mounted. When the electric power is supplied to heating element it got heated up and transfer that heat to the mould filled with the plastic which is placed on support plate.

Simultaneously, some amount of compression load is applied from the top by using the plate provided with vertical movement. Due to the heat supplied and the load applied, plastics filled in the mould starts to melt and fuse together to form tile of required shape, size and thickness. After some time (say 10-15min) the compressing plate will take back to its original position and stop supplying electric current to the heating element.

Finally, the moulded tile is allowed to cool gently in the mould and then it removed from the mould. These tiles are subjected to some finishing process (if required). Finishing includes trimming of corners, surface cleaning etc...

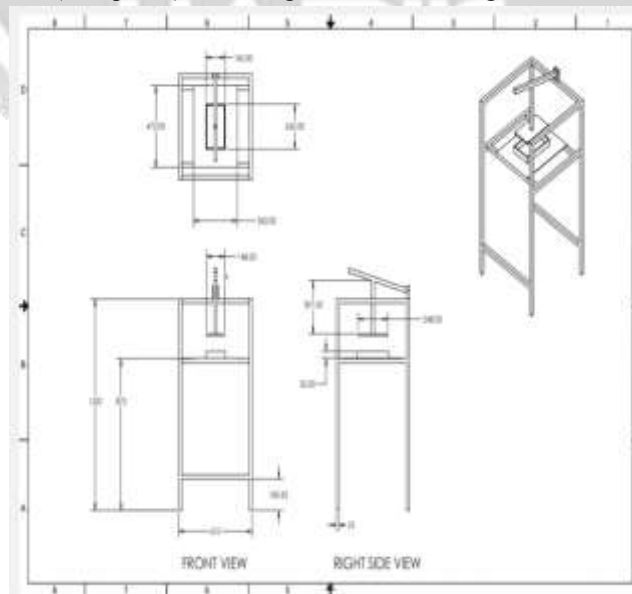


Fig 2: CAD Model of the Project

3. OBJECTIVES AND METHODOLOGY

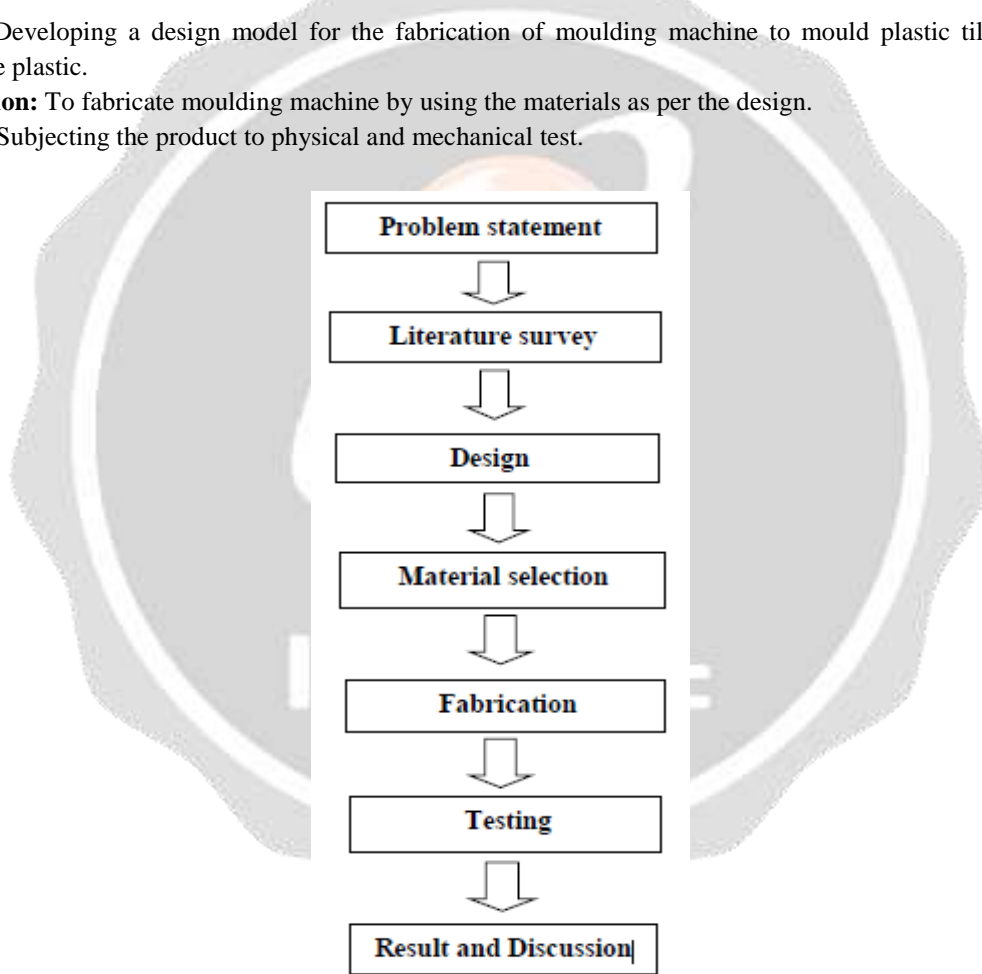
3.1 Objectives:

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- To protect environment from pollution due to solid waste.
- To develop an efficient and effective way of utilizing the plastic waste
- To reduce the consumption of natural resource such as clay and sand for manufacturing of tiles.
- To produce a cost effective, light weight and good strength product for domestic usage.
- To minimize plastic waste disposal problem.

3.2 Proposed Methodology:

- i. **Problem statement:** Developing an effective method to utilize non-recyclable plastic.
- ii. **Literature survey:** Collection of information with respect to any work carried out on utilization of non-recyclable plastic.
- iii. **Design:** Developing a design model for the fabrication of moulding machine to mould plastic tile by using non-recyclable plastic.
- iv. **Fabrication:** To fabricate moulding machine by using the materials as per the design.
- v. **Testing:** Subjecting the product to physical and mechanical test.



Flow chart. 1. Methodology

3. WORKING MODEL



Fig 3: Working Model

4. COST ESTIMATION

Materials	Number / Kg	Cost in Rs
MS frame metal	Kg	3000 Rs
MS Sheet metal	8 Kg	960 Rs
Heating element	2 pieces	1000 Rs
Teflon sheet	2 pieces	500 Rs
Nut and Bolt	10 pieces	100 Rs
Wire	4 meter	120 Rs
Labour		3000 Rs
Transportation		2000 Rs
Miscellaneous		3000 Rs
TOTAL		13,680 RS

Table 1: Cost Estimation

5. OUTCOME

- Fabricate a plastic tile moulding machine.
- Usage of non-recyclable plastic effectively.
- The fabricated tile might be used for domestic applications.

- Proper usage of non-recyclable plastic that might reduce environmental pollution because of plastic.



Fig 4: Fabricated tile

6. REFERENCES

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