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Design and fabrication of plastic brick making machine

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Abstract: *This study intends to design and fabricate a Plastic Reinforced Brick Manufacturing Machine that reduces the amount of plastic waste in landfills, which is a major source of pollution. Beverage packaging, which is commonly used for water, soda, cool beverages, and juice, as well as plastic bags and food containers, are the most prevalent recyclable plastic products. The bricks are used to reinforce these recyclable plastic items. Availability of traditional building materials, both in terms of quantity and quality, is a difficult issue for builders in this time of energy crisis and rapidly dwindling resources. The demand for building materials is skyrocketing on a daily basis, owing to the ever-increasing needs of the housing and habitat industries. The researchers were forced to re-orient themselves in order to evolve as a result of the catastrophe.*

Keywords – *Plastic Reinforced Brick Manufacturing, Recyclable plastic, Plastic brick*

I. INTRODUCTION

Plastics, being one of the most used materials by humans are also hazardous material. It is often used as a short-term replacement for any other alternatives which are usually costlier than plastic. For example, polyethylene bags are used instead of its more organic counterparts like Jute bags. It is a nonbiodegradable substance that stays as it is for centuries. Moreover, the amount of plastic waste generated per year is increasing every year. Approximately, every 10 years the rate of expansion is doubled. This can be attributed to the factors such as population growth, urbanization, industrialization, and change in trend and lifestyle. All these factors complemented with the population density of India, make the management of plastic waste a challenge which gets a bit harder every year to overcome. 40 million Tons of MSW has generated in India annually with an increasing rate of 1.5% to 2%. Hence, the only solution that is left with us is the effective utilization of plastic waste generated across the country which will not only solve the crisis of plastic waste management, but also strengthen the economy.

Plastic waste along with being non-biodegradable also causes land and water pollution. Among the various types of plastics used, Polyethylene (PE) is one of the most used. It is usually used in single use plastics such as carry bags, plastic bottles etc. One viable solution to using 2 this plastic waste can be Plastic bricks. These bricks will eventually be able to enhance our management of plastic along with promoting sustainable development. Traditional Bricks are made by clay, which puts stress on soil and also leads to soil erosion. The use of plastic sand bricks can be beneficial and would help to reduce waste. Thus, the use of plastic bricks is a promotion to sustainable development and eco-conservation at the same time.

II. PROJECT BACKGROUND

As there is a tremendously increasing plastic waste which goes untreated, there is a urgent need to utilize this plastic waste to make biproducts this need is many a times not fulfilled due to expensive machinery and equipment. there is a need to make travelling routes and roads for rural areas and hence the paper aims to design and fabricate a machine which uses PET plastic waste and sand which are cheaply available in the market and can be used to fabricate plastic bricks. The idea and experimentations on which the project is based on S. S. Chauhan, from the Department of Mechanical Engineering, G.L. Bajaj Institute of Technology & Management's studies and

tests on Plastic Bricks. The tests further mentioned in the papers are performed and the information is outsourced by their studies.

III. PROBLEM STATEMENT

Smaller fragments of plastics such as chips packaging plastic and drinking bottle plastic are produced in large quantities and are not recycled to an expected extent, causing a huge amount of these plastic shreds available online for sale.

IV. METHODOLOGY

The machine consists of three parts feeding, heating and moulding parts. The feeding part consists of hopper, lever, connecting gate the hopper and the AISI 4130. The heating parts consists only the heating bracket element and thermostat. The moulding parts consists of mould, nozzle and a metal plunger instated in the AISI 4130 pipe. When the plastic and sand composite is added to the feed and it is filled inside the AISI 4130 pipe where it gets heated at 120 degree Celsius and once melted the mixture is ejected out of the nozzle into the mould using the plunger which is attached to the lever.

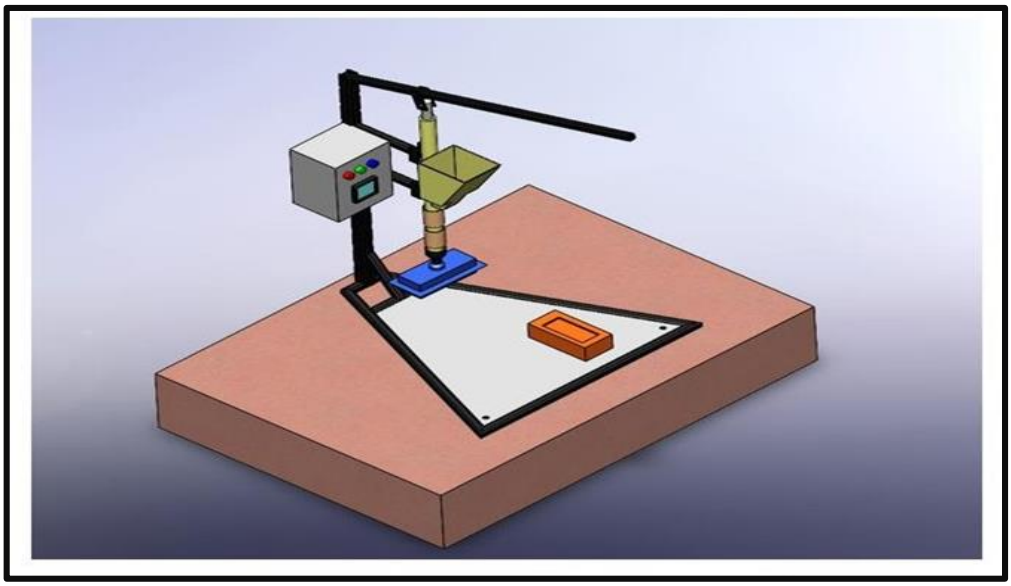

Fig 5.1

Table 4.1

Sr No.	Parts	Objectives	Source
1	Bracket Heating Element	Melting the composite	E-commerce site
2	AISI 4130 (Chromium)pipe of 2 varied Diameters (Length not yet decided)	To form a furnace for melting purpose	Crawford market
3	Galvanized Iron Sheet 1 Sq. Ft	To form mould of the machine	Scrap
4	Stainless-Steel Sheet 1 Sq. Ft	To form base of the machine	Scrap

5	Thermostat	To set and maintain constant temperature	E-commerce
6	Hopper	To input composite feed	Self-welded
7	Lever	To inject the liquid composite in the mould	Scrap
8	Stand	To support parts of the machine	Self-welded
9	Mould	To make plastic brick	Carpentered
10	Thermostat casing	To prevent thermostat from getting hot	Carpentered

V. CONCLUSION

Plastic Sand Bricks made of plastic waste which otherwise would have created pollution, possess advantages of cost efficiency, resource efficiency, etc. It leads us towards our sustainable development goal. The bricks made have less porosity and light weight with more compressive strength. Further research might improve the quality and durability of Plastic Sand Bricks. The results we have got shows us that the compressive strength of this brick is high when compared to the conventional clay bricks for the same size and also the weight of these bricks is less which in turn will decrease the dead weight of the structure. The water absorption of these bricks is very less 0.9 % - 4.5% and whereas in normal clay bricks it is around 15% - 20% of the weight of brick. Although, the fire resistance of plastic bricks is something that requires further research, in its current composition these bricks can serve excellently for water conservation purposes, Underground tanks or to form an underlining for sanitary landfills.

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