DRY WASTE MANAGEMENT

[1]Diana Jennifer, [2]Madhu Basavaraj, [3]Shiva Prasad, [4]Thilakraj K. L., [5]Mrs.VeenaRani
[1][2][3][4]4th year BE, [5] Assistant Professor
[1][2][3][4][5]Electricals and Electronics Engineering, Srinivas Institute of Technology, Valachil, Mangalore

ABSTRACT: The first synthetic plastic was produced in 1907 making the beginning of global plastic industry. The production of plastic in the year 2015 was 407 million tons which is roughly equivalent to two -third of the world's population. Out of the total production, around three quarters (302 million tons) ends up as waste. Dry Waste Management will help to minimize the pollution caused by plastic by implementing a device, which will help the disposal of plastic waste in an efficient way.

The waste plastic is fed to the device. This plastic waste contains various types of plastic and therefore the property is not even throughout. These plastic wastes are easily manageable and are sent into a processing unit for further processing. The plastic wastes are crushed, and then the crushed plastics are melted in a furnace so as to even out the property throughout the material. Thermosetting plastics are added to this melted plastic so as to strengthen the overall material. This heated or melted plastic is further set into moulds of tiles or interlock paver block. The end product is durable, cheap and therefore will help to solve the plastic waste problem in and around us and help maintain a Swachh Bharat.

Index terms: Plastic, Plastic waste management, Recycling, Reuse.

1. INTRODUCTION

Plastic were fabricated in 1860, however have solely been wide utilized in the last thirty years plastic square measure lightweight, durable, modifiable and hygienic. Plastic square measure fabricated from long chain of molecule referred to as Polymers. These polymers will then be created into granules, powders and liquids, changing into raw materials for plastic product. Plastics became an essential half in today's world. At the time of would like, plastic is found to be terribly helpful however when its use, it's merely thrown away, making every kind of hazards. Disposal of the waste plastics poses an excellent hazard to the atmosphere and effective technique has not been enforced. Plastics square measure non-biodegradable polymers principally containing carbon, hydrogen, and few different components like element. Thanks to its non-biodegradable nature, the plastic waste contributes considerably to the matter of waste management. It's terribly tough to search out out different of plastic. Even plastic´s demand is increasing a day moreover as their waste. This project analysis has determined the utilization of waste plastics, a manufacturing plant designing and its practicableness in Metropolitan town. It's simply assumed that, once the utilization of waste plastic can increase then the solid waste management can search a lot of ways those to search out intent on collect them. The implementation of this project will develop such a lot of opportunities within the town. It are often an answer to manage waste plastic, develop a brand new technique or plan. Plastics area unit non-biodegradable material that resists microorganism attack. This helps to keep up a Swachh Bharat.

2. OBJECTIVES

- Objective is to emphasize the reduced use of plastic, meanwhile making the beneficial management of plastic waste.
- The most important reason for proper waste management is to protect the environment, reduces trash in landfills and for the health and safety of the population.
- By reducing the amount of solid waste through recycling programs and the implementation of waste reduction.
- To evaluate compressive strength and durability for ordinary concrete paver blocks, the same have been studied for various plastic paver blocks.
- Efficient transformation of plastic into tiles or interlock paver block
- To produce cost-effective paver block which a common person can afford easily.

3. DESIGN

3.1.1 Shredder

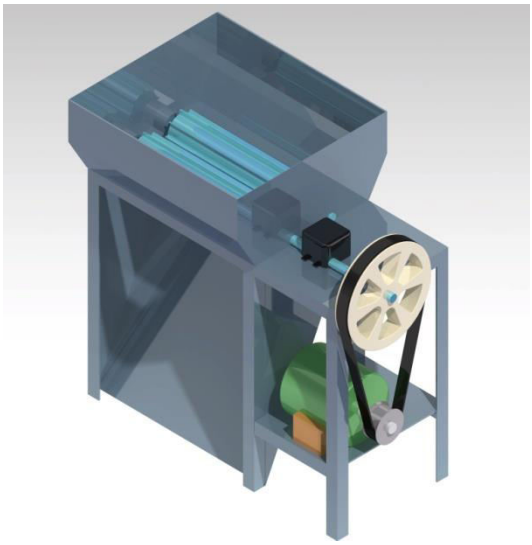


Fig 3.1 Design of Shredder

Some of the factors considered in the design of the recycled plastic waste shredding machine are safety, power requirement, and compactness, ease of operations and overall cost of production. Material selection based on availability, durability, cost and case of fabrication were also considered.

3.1.2 Shaft

The cylindrical shaft is made of mild steel of diameter 35mm and 600mm long. The shaft was stepped down at both sides to a diameter of 25mm so as to accommodate the bearings of diameter 25mm on the shaft. The shaft is machined on the lathe machine.

3.1.3 Cutting blades

The blades are made of mild steel and of length 46mm and thickness 5mm. The blades are divided into two parts, the fixed blade and the movable blades. The movable blades are bolt on the blade carrying bars welded on the shaft while the fixed blades are bolt on the edge of the lower hemisphere of the cutting chamber.

3.1.4 Electric Motor

A1-phase electric motor with 1.1kW (1.5hp), 1400rpm and 50Hz was used.

3.1.5 Transmission Drive

The power transmission drive used for the machine is belt and pulley drive.

3.1.6 Design for drive pulley

Velocity ratio, this is calculated using the formula:

Velocity ratio=diameter of the driven pulley ÷ diameter of the driver pulley

Diameter of driven pulley= 152.4mm

Diameter of driver pulley= 88.9mm

Velocity ratio= 152.4mm = 1.71

Output speed,

Output speed = input speed/ velocity ratio

Therefore, input speed, input speed means speed of ac motor 1440rpm.

Velocity ratio = 1.71 = 1440

Output speed= 1.71 = 847 RPM

N2= 847 rpm

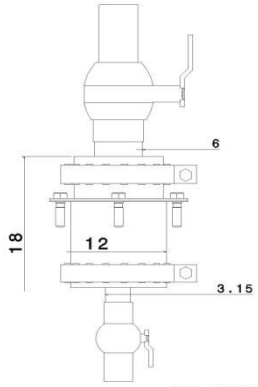
Required Torque to produce Power

P = 2ΠNT / 60

1.5*746 = 2*3.14*1440*T / 60

T = 7.4 N-M

3.2 Boiler



ALL DIMENSIONS ARE IN INCHES

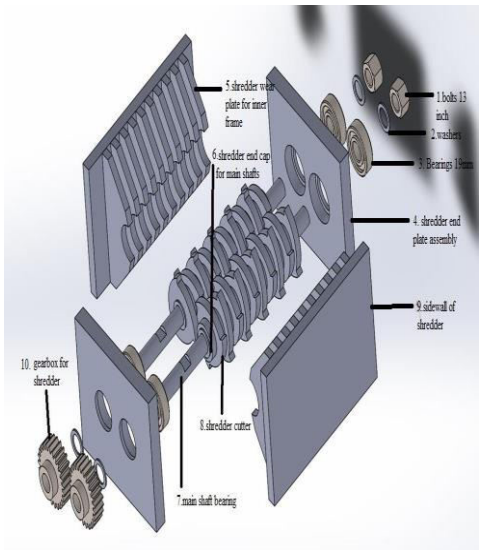


Fig 3.2 Dimensions of boiler

Boiler style is that the method of planning boilers used for numerous functions. Steam created during a boiler is used for a range of functions as well as area heating, sterilization, drying, humidification and power generation. The most operate of a boiler is to heat plastic.

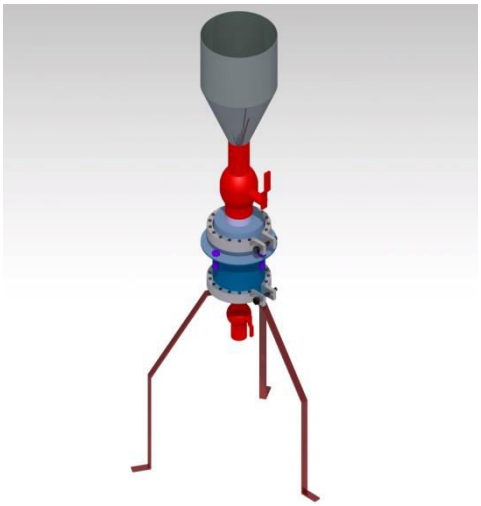


Fig 3.2.1 Design of boiler

Boiler measurement:

Diameter – 150mm

Height – 250mm

Ceramic band measurement:

Upper band =20 × 2 × 1100W × 240V

Lower band =20 × 2 × 1100W × 240V

4. COMPONENTS

4.1 Major components of shredder

1. Shredder and plate assembly
2. Bolts 13 inch
3. Washers
4. 18mm bearings
5. Shredder wear plate for inner frame
6. Shredder end cap for main shafts
7. Main shaft bearings
8. Shredder cutter
9. Side wall of shredder gearbox for shredder

Fig.4.1 Major Components in shredder

4.2 Induction Motor

Fig 4.2 Three phase induction motor to drive the shredder

These 3 – part motors carries with it a stator coil and a rotor and between that no electrical affiliation exists. This stator coil and rotors square measure made with the utilization of high – core materials so as to cut back physical phenomenon and eddy current losses.

Name plate details

- Voltage=415V
- Horse power (HP) =0.5HP
- Efficiency = 86%
- Current=0.8A
- RPM=1320rpm

4.3 Shredder

Fig 4.3 Shredder

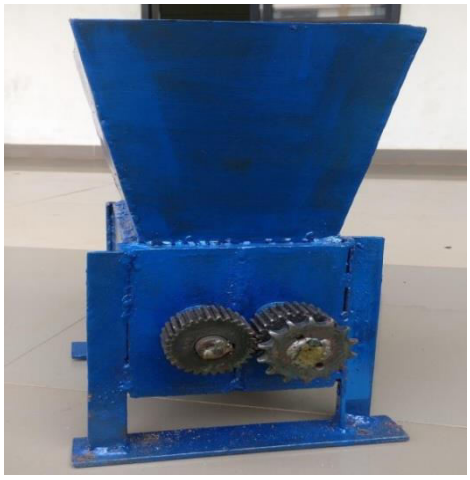
The PCB shredder has four main components; the feeding unit, the shredding unit, the power unit and the machine frame. The feeding unit is made of 16 – gauge galvanized mild steel sheet of 2 mm thick plate and a dimension of 200 mm × 550 mm through which the waste plastic are fed into the shredding unit. The shredding unit is where the PCB waste are been cut into smaller sizes.. Underneath the shredding unit is the outlet made of 16-gauge galvanized mild steel of 43 mm × 27 mm dimension. The shredded waste discharge freely from the shredding unit through the outlet. The machine is powered by 0.5 HP electric motor with the aid of chain driven arrangement.

4.4 Major components of Boiler

1. Ceramic Band Heater
2. Ball Valve
3. Burning Chamber
4. Ds18b20 temperature sensor
5. Hopper
6. Supportive leg

Fig 4.4 Boiler and Final Product

5. METHODOLOGY



5.1 Working

In the first step, we should collect the waste plastics of HDPE type such as, shampoo bottles, toys; grocery bags are sorted out and remaining are disposed safely. Next the collected wastes are cleaned and it is put into the crusher to cut the plastics into tiny chunks or pieces, where it converts into a single use plastic, which involves electrical heating.

The next procedure where, the crushed product are taken out and then it is sent to the boiler to melt, as it warms up it will reduce in size and mix the complete crushed product. Hence, the required materials are added to increase the strength of the plastic. Heating

must continue until all lumps are removed and a homogenous paste is obtained, which acts as a binder, is very well mixed in and looks like grey cement.

Then prepare the mould by making sure it is very clean, with no pieces of plastic on it and well oiled, then that mixture is put to the mould with the trowel. The mixture is very hot so must be careful. Press and work the mixture into the moulds so there are no air gaps formed. Allow the hot mixture in the mould to set for a few minutes, repeatedly shaking the mould to loosen the edges. Keep trying to lift the mould, when the mixture has hardened enough that the slab will not collapse, allow it harden around for two hours, remove the mould and desired shape of interlock blocks are obtained.

5.2 Steps involved in process

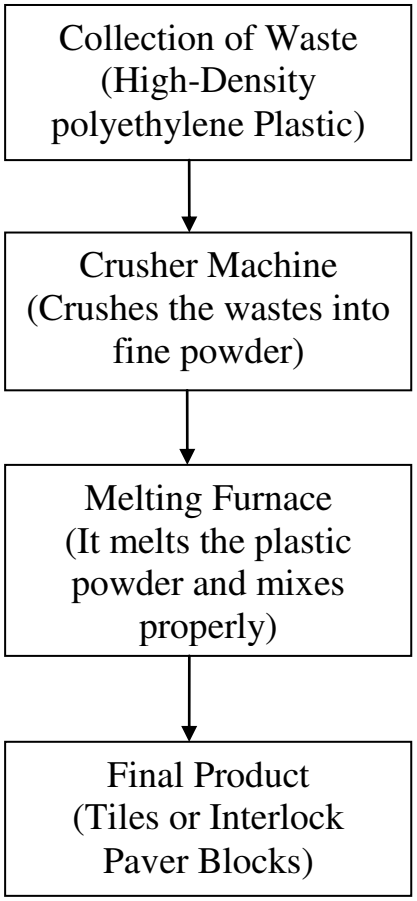
These functions are called the "three basic functional elements of our project, dry waste management" for the protection of public health.

i. **Collection:** first fundamental function. It refers to the gathering of waste from place such as residences, commercial, institutional and other public places.

ii. **Processing:** second fundamental function. Here, the plastic wastes are collected from public places. It is then put to the crusher to cut the plastics into tiny chunks or pieces and then it is sent to the boiler where it melts and mixes properly. For the better durability, required materials are added to increase the strength of the plastic.

iii. **Final Product:** third fundamental function. Then that mixture is put to the mould and desired shape of tiles or interlock paver blocks are obtained.

5.3 Flow diagram



6. CONCLUSION

Advantages of paver plastic blocks involves efficiency in cost, by removing the product which are waste later then abolish the facing problem of land requirement of discarding plastic. By converting flue gases into synthetic the emission of greenhouse gases will be controlled. So it is better to use the waste plastic in construction sector in different prospects. It's because the value of the recycled product is significantly less than the cost for producing. Recycling is the only way to reduce the intensity of plastic on the earth surface.

7. FUTURE SCOPES

When plastics are used in block of pavement, it acts as a partial solution by protecting the environment and ecological challenges associated with the use of plastics. Thus by utilization the plastic which might

be used as a fabric for construction. The price of paver block is reduced in comparison to it of concrete paver block. Wherever it may be utilized in gardens, pedestrians path and cycle method etc. additionally this finalized paver block may be utilized in non traffic and lightweight traffic road.

REFERENCES

[1] Maneeth P D, Pramod K, Kishor Kumar and Shanmukha Shetty, "UTILIZATION OF WASTE PLASTIC IN MANU FACTURING OF PLASTIC-SOIL BRICKS", International Journal of Engineering Research &Technology (IJERT), Vol. 3 Issue 8, August – 2014.

[2] Dinesh.S, Dinesh.A and Kirubakaran.K, "UTILISATION OF WASTE PLASTIC IN MANUFACTURING OF BRICKS AND PAVER BLOCKS", International Journal of Applied Engineering Research, ISSN 0973-4562 Vol. 11 No.3 (2016).

[3] LairenlakpamBillygraham Singh, LoukhamGerion Singh, Pongsumbam Boss Singh and Suresh Thokchom, "MANUFACTURING BRICKS FROM SAND AND WASTE PLASTICS", International Journal of Engineering Technology, Management and Applied Sciences, March 2017, Volume 5 Issue 3, ISSN 2349-4476.

[4] B.Shanmugavalli, B. Eswara Moorthy, "Reuse of Plastic Waste in Paver Blocks". ISSN:2278-0181 : Vol. 6 Issue 02, February-2017