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Recycle Plastic Tiles Maker

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Abstract: *The plastic is the highly used man-made material in the world due to the characteristics such as easy manufacturing shaping, cheaper cost and low density. And because of this satisfactory properties and characteristics of plastic material it is very useful in different areas such as medicine, architecture, construction and transport. Eventually later-on the used plastic is thrown away in nature without any disposal. And as we all study in school that plastic waste is a non-bio degradable substance in nature and generally, it consumes 100's of years to decompose in environment, and throwing or leaving it away in nature is not the solution for decomposing. Eventually in result, it just not harms the nature but also gets hazardous to human mankind and other living creatures which exist on earth. Instead of throwing plastic waste we can reuse it in some productive form, one of which form. The general objective of this research work was to contribute to the environment. As we know that paver block or concrete blocks are used in footpath, in building compound and likely in many other places as a flooring but according to the time the same paver blocks and concrete tiles get damaged because of water drainage, depletion of adhesive and many more reason. So instead of concrete block/tile we can use the plastic tiles made from the plastic waste which can easily moulded in any shape and as it is a plastic scrap it can easily available, production cost will be also low and as it can able to sustain the water more healthily than concert. At last, reusing the plastic waste also result in eliminating the waste from the environment.*

Keywords: *Recycle Plastic, Plastic Tile, Concert, Adhesive, Plastic Waste, Floor tiles.*

I. INTRODUCTION

Concrete Paver block flooring are very flexible, adaptable, cost effective as well as good-looking tiles that required low or comparably negligible maintenance if perfectly manufactured. Most concrete block flooring constructed in Indian infrastructure has performed adequately good unfortunately in few noticeable areas of concern get fail due to excessive surface wear, and variation in the strength of block. To overcome on such situation the sustainable development material for construction must be imply. And in result we can use Non-conventional, innovative materials, and waste materials in recycle form, in order to atone the lack of natural resources and to find auxiliary ways to protect the environment from draining of required material worldwide.

If we define a Plastic scientifically, it is a synthetic or semi-synthetic material which are polymeric and are composed of large molecules of organic substances known as monomers. During the process of polymerization, a large molecule is formed which are known as polymers. Generally, there are two main division in the plastic – Thermosetting plastic and other is Thermoplastic. Defining the thermoplastic, this form of plastic does not go under any chemical changes in their composition when subjected to the heat. And this form of plastic can be re-mold into another shape even after solidification. While in thermosetting plastic which are also known as non-recycle polymers goes under the chemical change which irreversible when subjected to the heat. And cannot be remold into any other shape after once it solidified. If we study the plastic object that are used in day-to-day life, we can understand that there is various type of polymer plastic which are manufactures according to their properties.

- 1) *High-Density Polyethylene plastic:* Due to the property of better Chemical resistance, Good low temperature resistance and have Higher tensile strength with good processability this form of plastic is use to manufactures products like motor oil containers, shampoos and conditioners containers, soap bottles, detergents, bleaches etc. which we used in day-to-day life.
- 2) *Low Density Polyethylene:* This type of plastic retains good balance of flexibility with good impact strength and so this form of plastic is used to manufacture products like cling-film, sandwich bags, and plastic grocery bags etc.
- 3) *Polyethylene Terephthalate:* This polymer has a high impact and tensile strength that makes it ideal to manufacture products like common household items like beverage bottles, water bottles, plastic medicine jars, rope, packaging films, and microwave container etc.
- 4) *Polypropylene:* Product likes lunch boxes, margarine containers, yogurt pots, syrup bottles, prescription bottles, plastic bottle caps etc. are often made from this type of plastic.

From recent CSE (Centre for science and Environment) research and analysis, around 79 percent of the use plastic enters into the land, water and environment and some of its also enters into the body of animals and humans by means of food consumption. And only 9 percent of the total waste plastic is recycled worldwide.

As per the recent 2018-19 report by a Central Pollution Control Board (CPCB) around 3.3 million metric tonnes of plastic waste is generated in India. As the result the same waste plastic haunts the human mankind as well as all the living creatures that plays the important part of balancing for the nature. So, to overcome this problem it is mandatory to eliminate the waste plastic directly or by recycling the plastic waste from the environment. And one of the ways is by replacing the concrete paver block or concrete tiles by recycle plastic block or tiles. The waste plastic that used in this project was collected from the surrounding areas.

II. PROBLEM STATEMENT

We know that the plastic is Hazardous for environment as well as for human mankind. And Plastic is easily available as a waste or scrap at cheaper value we decide to make some productive product from it. So, after some research we found the topic on “Recycle Plastic Tiles Maker” which can replace the concrete paver block or tiles by Recycled Plastic tiles/blocks. Generally, the Concrete paver block is made from the powdered Portland cement, water, sand, and gravel which is mixed in proper ratio. As you notice, the paver block that are used for footpath get damage or their adhesive get less effective when it comes in contact with water and because of it the block also gets slippery and lastly the life of paver block reduces. So instead of using concrete paver block we can replace the same with the Recycled plastic block or tiles using some binding. And as we know plastic can sustain more water compare to concrete therefore the life of the tiles will be longer. And as block or tiles are made from recycle plastic the cost will be also less compare to concrete paver block or tiles.

III. METHODOLOGY

1) *Plastic Collection*: Collecting the sufficient amount of plastic waste from the scrape or dumping area.

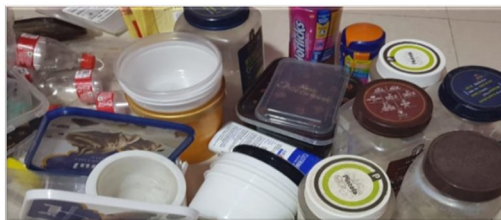


Fig.1 Waste Plastic Collection



Fig.2 Waste Plastic Collection

2) *Plastic Sorting and Segregation*: Segregating the plastic and sorting it according to the thickness, colour, shape and size.

3) *Shredding of Plastic*: The segregated plastic scrape is then cut in small pieces using the cutting machine to melt the plastic easily and evenly.



Fig.3 Shredding of Plastic

- 4) *Washing & Cleaning*: The shredded plastic is then washed to remove glue, paper labels, dirt and any remnants of the product.



Fig.4 Washing & Cleaning

- 5) *Preparing of Mold*: To give the molten plastic its final shape as per the requirement, the Mold is made by sand, wood or by MS plate.



Fig.5 Wooden Mold

- 6) *Melting*: The small shredded pieces of plastic are then liquefied gradually by melting process using the industrial heater or industrial oven to get to melt the plastic evenly.



Fig.6 Industrial Oven

- 7) *Adding Binding Agent*: Binding agent is added to the Molten plastic before pouring the molten plastic into the Mold



Fig.7 Binding Agent

8) *Pouring & Solidification:* As plastic turn into liquid form it is then pour into desire shape Mold and kept it to solidify.



Fig.8.1 Sample Specimen 1



Fig.8.2 Sample Specimen 2



Fig.8.3 Sample Specimen 3

9) *Testing:* After the solidification the same plastic tile/block will be tested on UTM machine for tensile strength, and compressive strength. For Compressive strength (N/mm²) = (Ultimate load in N / Area of cross section (mm²)).

IV. RESULT

In our project we used waste plastic as our core material and to add some strength to the tiles we also used binding agent in some percentage.

A. Dimension Table

Table - 1

Specimen No.	Length	Width	Thickness	Binding Agent (%)	Weight (gram)
1	26	14	10	20	110
2	26	14	10	30	127
3	200	100	30	35	492

B. Result After performing Drop Test and Hammer Test for Specimen 1 and 2,



Fig Sample Specimen 1 Result



Fig Sample Specimen 2 Result

Table - 2

Specimen No.	Drop Test (height in feet)	Result	Hammer Test (No. of Hits)	Result
01	7	Fail	-	-
02	7	Pass	9	Fail (After 9th Hit)

C. Data Analysis For Specimen 3,

After performing two differet test on our both specimen we got the result as Fail. So later we design our third specimen after performing the theoretical analysis on the analysis software and we got the theoretical result for our specimen 3. Depending on the collected data we create the Sample specimen 3.

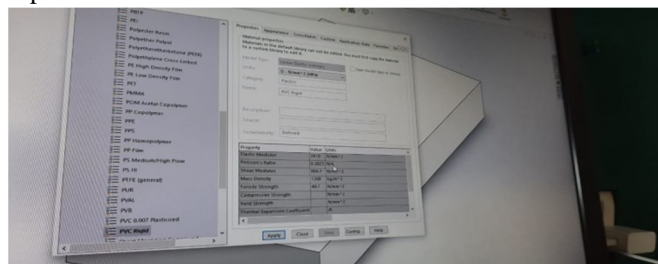


Fig Analytical Result of Specimen 3

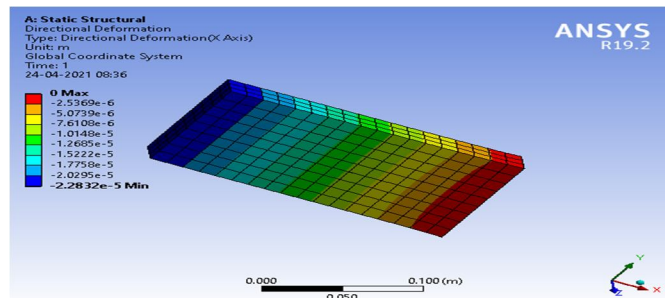


Fig. Theoretical Result of Specimen-3 on Ansys Software

Table -3

Property	Result	Units
Tesile Strength	40.7	N/mm ²
Elastic Modulus	2410	N/mm ²
Poisson's Ratio	0.3825	-
Shear Modulus	866.7	N/mm ²
Mass Density	1300	Kg/m ³

V. CONCLUSION

- A. Manufacturing the Plastic paver block is a effective way of eliminating the plastic waste from the system.
- B. Efficient usage of plastic waste in paver block has resulted in effective usage of plastic waste.
- C. The use of plastic waste in this form can result in safe disposal of plastics.
- D. This recycle Plastic paver block can be use in areas like, light traffic road or foot path, in gardens, pedestrian path, building compounds and cycle way
- E. Also, the time requires for manufacture this recycle tiles can be less
- F. And mainly this plastic block can be Cost effective as cost of cement is high compare to plastic waste which we get in free of cost.
- G. As the tiles are made up of recycle plastic it can also use in marine application like raft, floats etc. Because plastic is very light in weight.
- H. This plastic tiles also gets good machinability in finishing and cutting.

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VII. CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

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