

Manufacturing Of High Strenth Floor Tiles

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ABSTRACT

Countries like India having larger rate of population which require best infrastructure as well as all facilities for the people of country. We have chosen plastic as one of the main raw material for manufacturing of our tiles.

Conventionally China clay, feldspar and glass is used in tile manufacturing and we are altering these materials by black cotton soil clay, plastic waste, incineration waste and egg shell. Proper waste management and proper recycling and proper usage of these wastes has to be bought efficiently in existence.

This technology is environmentally friendly and potentially cost effective. Human activities often generate solid wastes such as plastics and egg shell wastes. Disposal of these wastes is usually a problem. The aim of this study was to investigate the feasibility of using plastic and egg shell wastes together with white cement in the production of floor tiles. researchers have attempted to reuse incinerator bottom ash (IBA), the residual from incinerating municipal solid waste, for ceramic production. This study focused on investigating proper IBA replacement level for manufacturing interior and exterior floor tiles.

Keywords: Flooring, economical tiles,

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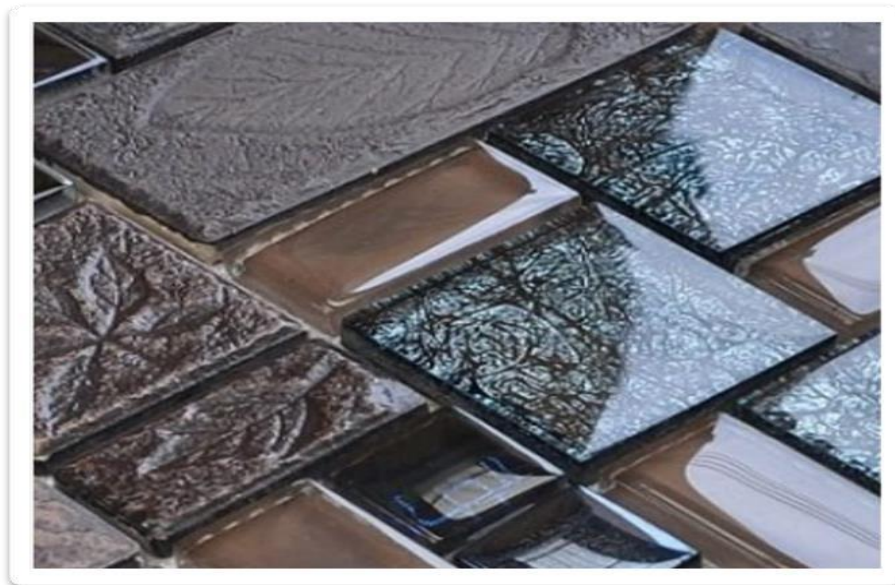
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I. INTRODUCTION

- Countries like India having larger rate of population which require best infrastructure as well as all facilities for the people of country.
- We have chosen plastic as one of the main raw material for manufacturing of our tiles
- Conventionally China clay, feldspar and glass is used in tile manufacturing and we are altering these materials by black cotton soil clay, plastic waste, incineration waste and egg shell .
- Proper waste management and proper recycling and proper usage of these wastes has to be bought efficiently in existence
- Plastics are having high molecular mass with the composition of organic polymers. Plastics are non-biodegradable materials it should take a long time to decompose, so soil and land pollutions are increased. In reality, we cannot stop plastic to reach soil and water, so we considered as the plastic is a raw material for the making of the tiles, with the replacement of the clay. Plastic had malleable property, so it can be easily moulded into convenient shapes. Due to the low-cost, versatility, non-corrosiveness and impervious to water, plastic is used for multiple purposes at different scales. The replacement is three types, the first one is plastic and sand, the second one is plastic and quarry dust and the third one is plastic, sand and quarry dust. The proportions are 65%, 70% and 75% of plastic are used in all the above three conditions. When compared to the normal tiles (ceramic tile), plastic tiles had more compressive strength and less water absorption. Plastic materials are having high molecular mass with the composition of organic polymers. These are non-biodegradable materials, so it should take a long time to decompose. Hence, these materials cause soil and land pollutions and increase day by day. Plastic materials having a malleable property, so it can be moulded into convenient shapes. Due to the low-cost, versatility, no corrosiveness and “MANUFACTURING OF HIGH STRENGTH FLOOR TILES” 2022-2023 Department of Civil Engineering, Dr. T.T.I.T, KGF. Page 2 imperviousness to water, plastic can be used for multiple purposes at different scales.
- As approximately 60% of plastic waste is expected to cause land contamination in both urban and rural areas. Typically, a huge quantity of clay is required for making of tiles. The waste plastic is used for making of tiles. Which is around 70% of total plastic consumption is formed as a waste plastic in India, which is approximately 15342 tons per day. In the present scenario, we can't eliminate the use of plastic in our present lifestyle. By using waste plastic in the construction sector, we can reduce the waste plastic intensity. So, we are using plastic as one of the building materials. Tiles are used for floor finishing in building constructions,

those tiles are manufactured with a natural resource such as clay. By replacing the waste plastic instead of clay in tiles we can use more waste plastic in construction.

- The Taiwan Environmental Protection Administration (TEPA) has launched a series of municipal solid waste incinerator construction projects to offer one incinerator for each local government starting from 1991. As the incinerators start to function, past problems caused by solid waste disposal has been resolved while incineration becomes the primary method for treating municipal solid waste. However, the increasing amount of incinerator bottom ash (more than 100 million tons per year and increasing each year) has raised new environmental issues. Landfills have been the number one option for incinerator bottom ash but is not deemed as a sustainable solution. Many researchers have been studying recycle and reuse of incinerator bottom ash (IBA) so that the ultimate sustainable goal of zero-waste can be achieved someday (EPA 2020). Incinerator bottom ash is a light-weighted porous material with high water-absorbing characteristic (Balapouret al. 2020). The product made with bottom ash tend to be brittle and easy to wear (Filipponi et Al. 2003).



II. MATERIALS USED

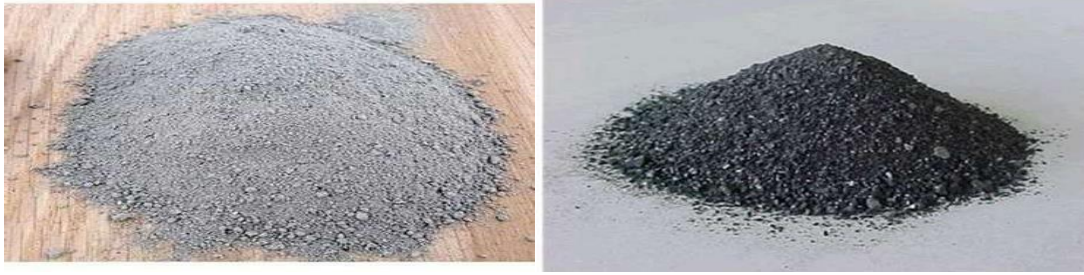
- [i] BLACK COTTON SOIL
- [ii] INCENERATION WASTE
- [iii] PLASTIC WASTE
- [iv] EGG SHELL

BLACK COTTON SOIL



NCENERATION WASTE

Bottom ash is the residue that is fused into heavy particles that drop out of the furnace gas stream. The color of bottom ash ranges from Gray to black. Bottom ash has an angular texture, and it is a relatively well-graded, sand-sized material the moisture content of bottom ash ranges from 20% to 70% of the dry weight of the ash. Bottom ash is the residue that is fused into heavy particles that drop out of the furnace gas stream. The color of bottom ash ranges from Gray to black. Bottom ash has an angular texture, and it is a relatively well-graded, sand-sized material the moisture content of bottom ash ranges from 20% to 70% of the dry weight of the ash.



PLASTIC WASTE

Some physical properties: transparency, flexibility, elasticity, permeability,waterresistant, electrical resistance, Specific Gravity, soft when hot.

Some chemical properties: solubility, chemical resistance, thermal stability, reactivitywith water, flammability, heat of combustion.



EGG SHELL

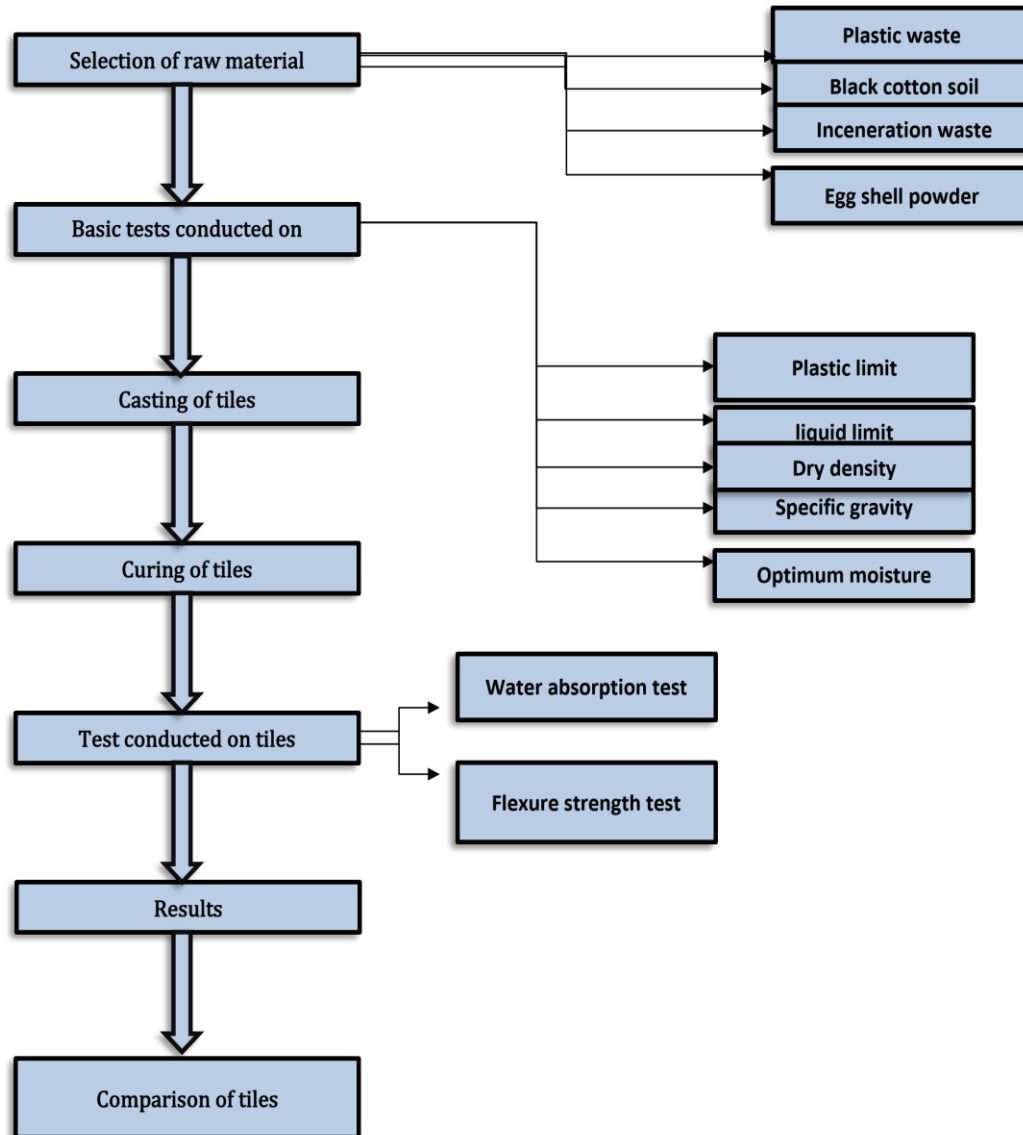
Eggshells contain around 900mg of elemental calcium (calcium that can be absorbed by our body) and it is found in the form of Calcium Carbonate. It also contains other



microelements like boron, magnesium, manganese, copper, iron, molybdenum, sulphur, zinc, etc.

III. METHODOLOGY

□ We have chosen plastic as one ofthe main raw material for manufacturing the floortiles. □ Selected raw materials which are black cotton soil, incineration waste, plasticwaste, egg shell.



PROCEDURE

The following steps are procedure of casting of tiles

- Step1: Segregation of high-density plastic and low-density plastic
- Step2: Heating of the container up to 200-250°C until the fumes arrive.
- Step3: Place of low-density plastic into container and letting it to melt (molten state).
- Step4: Once low-density plastic is completely melted, then add high density plastic.
- Step5: Check for the temperature using thermometer (approximately 250°C+).
- Step6: Add the segregated black cotton soil and stir it constantly with uniform speed in order to eliminate lumps.
- Step7: Fire the mixture until bubbles arrives over the molten liquid.
- Step8: Prepare the mould by applying grease over the surface.
- Step9: Pour the mixture into the mould and let it for drying for 2 to 3 min.
- Step10: De-mould the tile once after hardening.



IV. RESULT AND DISCUSSION

TILES TESTING

The minimum of three tiles for each test has been done on tiles two tests has done.

- [i] WATER ABSORPTION TEST
- [ii] FLEXURAL STRENGTH TEST

TESTS	PLASTIC TILE	FACTORY TILE
WATER OBSORPTION TEST	0%	2.5%
FLEXURAL TEST TILE 1 TILE 2	0.21 kn/m ² 0.18 kn/m ²	0.15 kn/m ²



MIX DESIGN

TRIALS	PLASTIC IN %	BLACK COTTON SOIL(%)	EGG SHELL POWDER (%)	INCENERAT ION WASTE (%)	RESULTS
1	35	35	20	10	Success in casting fails in testing
2	30	40	10	20	fails in both
3	60	20	10	10	success in casting fails in testing
4	30	50	10	10	fails in both
5	50	30	20	-	success in casting fails in testing
6	60	40	-	-	success in both
7	65	35	-	-	success in both

BENEFITS OF THIS SYSTEM

Manufacturing process and tiles cost is less compared to factory tiles it has higher strength and stiffness Relatively higher resistance to corrosion It has high durability Recycling the plastic waste Reduced hazardous effect on environment

V. CONCLUSION

- Suitable replacement of conventional materials by waste materials gave a composite material which is having better properties than conventional
- This method helps nations in waste management both on surface and oceans
- By this study we identified black cotton soil clay is better replacement for china clay in tiles manufacturing

FURTHER SCOPE OF THE PROJECT

The mix design is done based on the limited literature and experimental study. The tile can be manufactures by adding still more waste materials and its optimum composite.

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