

“Use of Carbon Pollutant In Building Tile”

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Abstract - This paper presents the findings from an undergraduate research project concerning the environment friendly, manufacturing of carbon tile.

This paper focus on highlighting new and innovative methods that the quality of physical environment improves through the use of building techniques that enhance planning for environmental protection and advancement. It will provide a focus to improve sustainability in a global context.

Industrialization is important for the development of country, but rapidly increase in the industrialization is giving rise to air pollution which is injurious to human health and atmosphere. Dumping the industrial residue is also not the solution to avoid pollution, as it leads to land pollution.

To tackle the this design and technology plays important role to give scalable solution.

As tile is important construction material manufactured with the help of ceramic, clay, glass, cement. These are generally used to cover roofs, walls, floors. Because of the variation in design, color it is also used for decorative purpose the rapidly growing construction industry and world trade making the high tile production. Replacement of raw material used in the ceramic tile with the industrial residue can be better solution to the society, crafting such tiles with the traditional method saves the five times energy as compare to ceramic tile. Manufacturing of such tile also gives the employment to those local communities who are unskilled to improve their standard of living.

KEYWORDS:-Eco-friendly, Employment, Sustainability, building material, carbon

1.INTRODUCTION

As an construction material “Tiles” have a historical significance in decorative spaces and artistic exhibitions.

As the population rising, world is growing faster and demand for construction activities is increasing day - by - day with increase

in construction activities these in rapid growth of sugar factories, chemical industries and various industries leading to the increase in air pollution.

When we take into the consideration the air pollution is occurring due to construction activities as it caused by the industries it's air pollution leads to alarming situation as it is causing harm to environment and leads injurious to human as well as eco-system.

To overcome these what we require is the innovation that is use of the pollution as base for good result and we had come to conclusion of making “Tile”, It is a very important construction material used since past centuries now - a - days its demand is increased due to its demand in decorative feature.

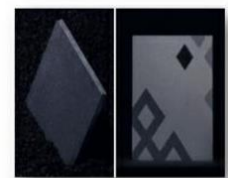
As carbon is most abundant gas released from industry cause air pollution, as inventory published in November -2015 that 20,721 tones of carbon is emitted which leads to rise in global warming.

Casting the tile using these carbon emission can be environment friendly, through such pollution cannot remove 100% of the pollution but can be effective in reducing the pollution.

There are many challenges we faced in designing and manufacturing the tiles. Let's know how carbon tile is different from ceramic tile



Ceramic Tile



Carbon Tile

Fig-1: Ceramic tile and Carbon tile

Table-1: Differences between ceramic and carbon tile

Sr.No	CERAMIC TILE	CARBON TILE
	Based on properties - -It has high strength of 350-400 kg/cm ² . -Thickness of ceramic tile lies in between 50-60 mm.	Based on properties- -Carbon tile has wet transverse strength greater than 3 N/mm ² . - Thickness of carbon tile 20-25 mm.
2	Based on cost analysis- -Generally ceramic tile cost in between 50-150/sqft	Based on cost analysis- -Carbon tile rate cost 60/ sqft which is economical than the ceramic tile.
3	Based on employment- -The tile making of ceramic involves the various process and requires skilled labour. -It has machinery to perform the work.	Based on employment- -This tile making process is providing jobs to the unskilled labour so that they can imposed standard of living. -It can be hand made production.
4	Based on energy consumption- -Here in ceramic tile all sector are energy intensive that means they require energy to perform various process as it requires firing between 600-2000 degree Celsius.	Based on energy consumption- -When we take into consideration the carbon tile firing does not needed. -It takes 5 times less energy as compare to ceramic tile.
5	Based on environmental impact-	Based on environmental impact-

	-Ceramic tile uses more energy and manufacturing of such tiles creates the pollution.	-In this type of tile carbon emission is used (which is released from industry).
6	Based on merit- - It is water resistance -Durable: 10-20 years. -More weight as compare to carbon tile.	Based on merit: - Maximum water resistance. -More durable than ceramic tile. -Minimum weight.

1.1 POLLUTION OF SOLAPUR CITY

Solapur is a city in the south western region of Maharashtra it is closely connected to the border of Karnataka.

Solapur has great historical significance of textile industries more than 150 textile mills are situated in solapur. Due to sugarcane productivity more than 28 sugar factories are located in the district and about 100 **construction industries** are situated in district. And around 6000 power looms are operated in entire Solapur district.

Due to all these things Solapur became one of the most polluted city in Maharashtra. In the tremendous amount of smog is emitted by sugar factories and heavy textile industries in the district.

• Solapur Air Quality:-

- 1) P.M 2.5 = 3 µg/cm³
- 2) PM10 = 58 µg/cm³

Due to increase in the air pollution severe respiratory diseases occurs and highly affecting to the health of human being as well as environment.

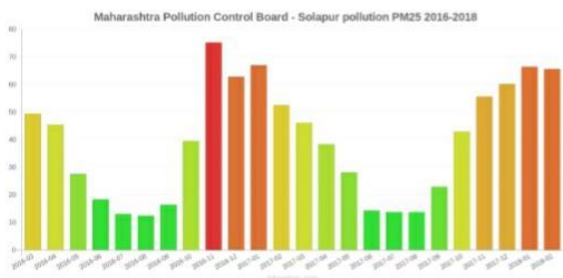


Chart-1: Pollution in solapur(PM25)2016-2018.

2.MATERIAL DETAILS :

1) Carbon (Powdered Form/Particulate Matter) :-

The quality of Carbon sample which we took from sugar factory, NTPC power station is good with respect to its fineness.

The different tests we performed on that carbon sample in small amount are as follows :-

*Percentage of carbon by proximate analysis method :-

a) Moisture Content Test=

We initially taken the sample by weighing 10gm in a bowl and performed test on carbon by heating it at 100 degree Celsius for 4 hours, it reduced the moisture content from sample. And then we again weighed it (Dry sample).

- Weight before heating sample= 10 gm

-Weight after heating sample= 7 gm



Fig-2:Moisture content test



Fig-3:Effect of temperature on sample

b)Carbon Content Test=

We kept that particular sample in oven for 2 hours at 800 degree Celsius and finally weighed it

Weight of sample (initial)= 10 gm

Weight of sample (final)= 8gm



Fig-4:Carbon content test

2)Marble Powder :-

As from name you will come to know that the marble powder is fine aggregate of marble (by process of crushing).

Before using the marble powder as it is which we took from particular place we initially sieved it.

3)Water :-

The water used for the proportion of all material. The water used is of room temperature from the college laboratory.

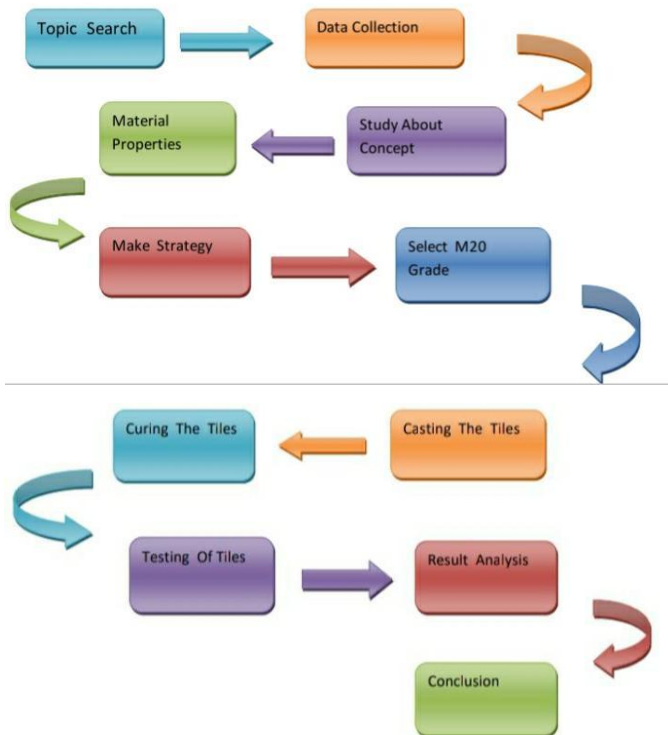
4)Fine Aggregate (M Sand) :-

M sand is the Manufacturing Sand. It gives high compressive strength than natural sand. The size of M sand is less than 4.45 mm.

5)Cement :-

Ordinary Portland cement have high strength .The pigment layer is hydraulically pressed into the surface and becomes a part of the tile.

3. METHODOLOGY :-



4. PROCEDURE :-

- a) Firstly take the mix proportion of sample . Mix the raw materials in mixer.
- b) The mixture of sample is should be made with of proper consistency.
- c) Take a tile mould of convenient size.
- d) Pour the sample mixture in layers with proper compaction and finishing.
- e) Then apply the pressure to get the tile to it's perfect shape and strength too.
- f) Remove the tile from the mould without damaging the edge.
- g) Then keep the tile for curing (tile piece should be suitably harden) .
- h) After curing, take the tile for testing to overcome the breakage, air gap and other .
- i) For the testing of the tiles following laboratory test has to be performed:-

- *Durabilty
- *Strength
- *Abrasion
- *Compression
- *Slip Resistance
- *Water Absorption
- * Wet Transverse Strength

j) After successful of those test, tile will be ready to use or we can say final product is ready.

5. CONCLUSIONS

- a) We overcome the solution which uses carbon for the production of tile resulting in air pollution .
- b) 1 carbon tile is equivalent to cleaning 30,000 liters of air .
- c) These tiles consume only one-fifth of the energy required to manufacture vitrified tiles.

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