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Use of Carbon Pollutant in Building Tile

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ABSTRACT: This paper is about implementation of industrial waste pollutant for manufacturing of carbon tiles in detail. This paper focuses on increasing level of air pollution due to various industries & vehicles.

Increasing air pollution is one of the biggest public health hazard worldwide. Air pollution causes social, economic and life style habits are related to this major problem. According to data available air pollution in India has increased rapidly due to over population and uncontrolled urbanization along with bad transportation system, poor land use pattern based on the magnitude of public health impact and effectiveness in controlling air pollution.

As we have visited several industries and sugar factories in our locality. Throughout this survey, we have found that waste residue dumped in open areas and landfills. By observing this waste pollutant we decided to utilise this in the most effective manner. Our research concerns ecofriendly, affordable manufacturing of carbon tile.

KEYWORDS: Carbon, Environment friendly, air pollution, affordable, sustainable development, employment.

I. INTRODUCTION

"Tile" is a very important construction material used since past centuries now - a- days its demand is increased due to its demand in decorative feature. In the era of tiles, our carbon tile one of the innovative invention. As the population rising, world is growing faster and demand for construction activities is increasing day - by - day with increase in construction activities with 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 and the industries, 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 pollutant as base for good result and we had come to conclusion of making "Carbon Tile".

Carbon tiles are extremely versatile & can provide amazing patterns & colors It also delivers texture and depth.

II. METHODOLOGY

Figure1. Methodology

TOPIC SEARCH-

Being a civil engineering student, we were interested to find such a topic which will be beneficial to construction industry as well as to common people. From various construction materials tile was our point of interest we have surveyed for different types of tiles we searched for constituent of tiles its manufacturing process and many more.

DATA COLLECTION –

As carbon tile is a researchable topic we have gone through various research papers. Initially we collected all the required data from various sources.

STUDY OF CONCEPT –

The conceptual phase is the initial phase of research and involves the intellectual process of developing a research idea into a realistic and research design

CASTING OF TILES-

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As casting is the major part of this entire project so in this stage, we had given our maximum input to get desired output. After the finalization of above steps, we decided to take some random combination of proportions and work on it and started the casting of tiles.

TESTING OF TILES-
After casting the tiles, testing is necessary to check the quality of product.

CONCLUSION-
Conclusion is the final step of the project where we concluded our project.

CASTING OF TILE-

Figure 2. Flow of casting process of tile

Figure 2 shows complete flow of casting process of tile. In our first part of casting, we have casted 22 tiles from that trials we have obtained 5 approximate successful proportions. By studying these 5 proportions we came across all possible 324 combinations of proportions. Out of which we have selected 42 combinations whose sum of proportions of material is 100%.
We have sorted these 42 combinations & casted those tiles.

After analysing 42 trials, we have finalised 11 proportions for casting. After studying these results of flexural test of 11 proportion. We came to conclusion that 11th proportion has more strength as compared to other trials.

Figure 3. Casting of tiles

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Table1. Final set of 11 proportions for casting

	Tile No.1		Tile No.2		Tile No.3		Tile No.4		Tile No.5		Tile No.6		Tile No.7		Tile No.8		Tile No.9		Tile No.10		Tile No.11	
Casting Date	3- Sep-2021		3-Sep-2021		4-Sep-2021		4-Sep-2021		4-Sep-2021		7-Sep-2021		7-Sep-2021		9-Sep-2021		13-Sep-2021		20-Sep-2021		20-Sep-2021	
Demoulding Date	6-Sep-2021		6-Sep-2021		7-Sep-2021		7-Sep-2021		7-Sep-2021		9-Sep-2021		9-Sep-2021		13-Sep-2021		15-Sep-2021		22-Sep-2021		22-Sep-2021	
	Gm	%	gm	%	Gm	%	Gm	%	Gm	%	Gm	%	gm	%	gm	%	Gm	%	gm	%	gm	%
Cement	641	17	453	12	565	15	700	20	700	20	595	17	540	15	540	15	540	15	566	15	566	15
Carbon	641	17	75	2	377	10	700	20	700	20	525	15	720	20	720	20	540	15	377	10	566	15
Marble Powder	490	13	792	21	565	15	525	15	350	10	315	9	180	5	180	5	180	5	377	10	377	10
Flyash	301	8	0	0	0	0	350	10	350	10	245	7	180	5	360	10	0	0	0	0	0	0
M sand(10mm)	1131	30	1244	33	1131	30	1225	35	1400	40	910	26	1440	40	1080	30	1260	35	1132	30	1132	30
M sand (4.75mm)	565	15	1206	32	1131	30	0	0	0	0	910	26	540	15	720	20	1080	0	1320	35	1320	35
Hardner	50		50		50		50		50		50		50		50		50		50		50	
Water	400		330		500		700		800		650		700						550		850	
Load(kg)	11.85		11.146		16.7		8.156		8.818		9.72		6.44		9.162		8.288		15.2		20	
Strength(N/mm2)	0.232		0.218		0.327		0.166		0.173		0.19		0.126		0.179		0.162		0.298		0.392	

TESTING OF TILES

For product conformity, quality control, safety, performance and legislative reason testing of tiles is required.

Figure 4. Successful Tiles

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TESTING OF TILES
a)FLEXURAL TEST

Figure 5. Flexural strength testing of tile

Result: Average flexure strength 0.39 N/mm2
b)WATERABSORPTION
water absorption test for carbon tile-
Water Absorption in %= ((M2-M1/M1) x 100)
were,
M1= Mass of dry tile, g
M2= Mass of wet tile, g
Result:
M1= 4.056
M2= 4.35
Water Absorption in %= ((4.35- 4.056)/4.056) x 100)
= 7.24

Figure 6. Water absorption test for tile

III. RESULT-

Following are the results which we have concluded after the completion of the project. Here in the result, we have finalized our "IDEAL PROPORTION" i.e., the 11th proportion in the table below. And we also found out optimum cost of the tile. Through the number of trials and continuing the research work we came across these results.

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Table 2. Increasing load values with different proportions of materials

Tile Number	Load	Cement (%)	Carbon (%)	Marble Powder (%)	Fly ash (%)	M sand (%) (10mm)	M sand (%) (4.75mm)
7	6.44	15	20	5	5	40	15
4	8.156	20	20	15	10	35	0
9	8.288	15	15	5	0	35	0
5	8.818	20	20	10	10	40	0
8	9.162	15	20	5	10	30	20
6	9.72	17	15	9	7	26	26
2	11.146	12	2	21	0	33	32
1	11.85	17	17	13	8	30	15
10	15.2	15	10	10	0	30	35
3	16.7	15	10	15	0	30	30
11	20	15	15	10	0	30	35

The above table shows the tile number and corresponding load which tile can withstand and the proportions of finalized materials such as cement, carbon, marble powder, fly ash, M sand(10mm) & M sand(4.75mm).

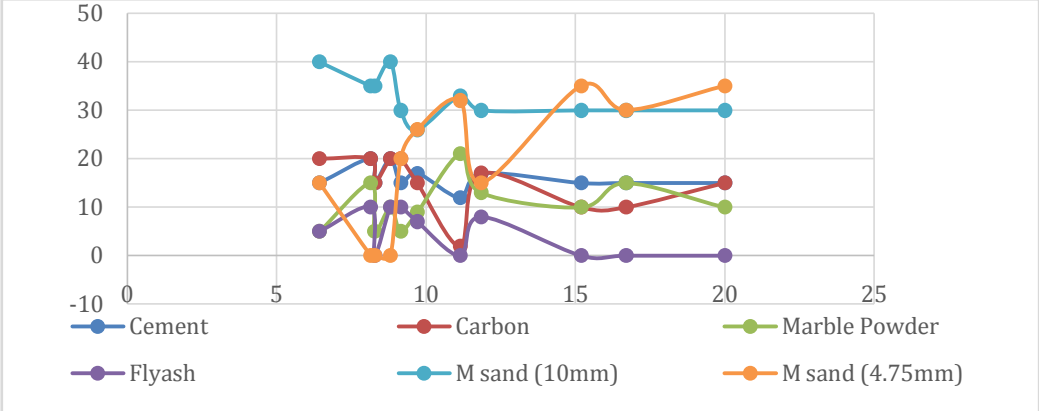

Figure7. Integrate effect of all material proportions on load bearing capacity of tiles

The above graph illustrates load and the different proportions of the materials taken. The X-axis represents loads (in kg) and Y- axis represents proportions of the materials (in %).
In the above graph, there are 6 materials namely cement, carbon, marble powder, fly ash, M sand(10mm), M sand(4.75mm). As per these materials load is ranging from 5 to 20.
From the above graph 20 is the highest load that tile can resist. At 20kg load corresponding material content are cement is 15%, carbon is 15%, marble powder 10%, fly ash 0%, M sand(10mm) is 30%, M sand(4.75mm) is 35%.

Table 3. Increasing cost of tile with reference to load taken.

Total Cost	Load
17.92	8.288
18.56	11.146
18.77	6.44
18.92	15.2
18.92	20
19.01	16.7
19.04	9.162
19.61	9.72
19.66	11.85
20.33	8.818
20.44	8.156

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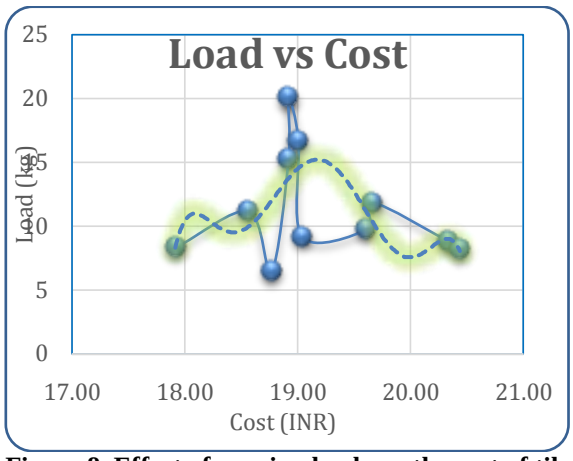

Figure 8. Effect of varying loads on the cost of tile

In the table 3. We have mentioned total cost(in □) and corresponding load (in kg) which tile can withstand.

And in the figure no 8. it represents the relation between total cost and load taken. In the above graph X- axis shows total cost (in □) and Y-axis shows load (in kg).

According to above graph, cost is ranging between 18□ to 21□ and the load varies from 6.44 to 20 kg.

Among all these load values 20 kg is the highest load and at this load the cost of tile is 18.92 ≈ 19□ .

From the above data minimum cost of tile is 17.92 but it can withstand the load of only 8.288 kg because of the variations in the material proportion.

So increasing the cost only by 1□ i.e 18.92 it gives the maximum load of 20 kg.

IV. CONCLUSION

As per the above study we can conclude that there are different types of tiles present as a construction material, of different sizes, shapes and colors. Variety of materials are used in the manufacturing of such tiles may be local or non-local materials.

Manufacturing includes various processes involved into this which requires manpower and machineries leading to the higher use of energy. Some of the materials are taken out through mining. Mining operations like excavation, blasting and transportation of material creates air pollution.

As this is developing era industrialization is a need of the country, larger amount of particulate matter are generated and leads to air pollution.

Considering all the above things in the mind.

We need the integrated solution of the problem after the searching we found the carbon tiles as a solution after conducting various experiments in the labs and by taking more than 70 trials of proportion, we successfully got the results we have achieved better strength of the tile.

We have found following conclusion after the completion of our project that are as follows:

1. Less energy consumption.
2. Low manufacturing cost.
3. Use of locally available materials.
4. Employment to unskilled labour.
5. Effective use of air pollution.

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