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Experimental Study on Paver Blocks using Waste Tyres

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Abstract - *Now a days, a huge quantity of tyre waste is found. Waste tyres are generally discarded after only a small amount of rubber is worn away. Waste tyre can be used as sand replacing material through construction point of view. We are replacing some percent of sand with crumble tyre of different sizes. Hardner is must for the binding of tyre with crumble particles of waste tyre.*

Key Words: **Waste Crumble tyre particles, Compressive strength, Durability, M30 grade**

1. INTRODUCTION

Unrecycled tyre waste is an enormous global problem because of their non-biodegradability, their flammability and their chemical composition that leads to leaching of toxic substances into the ground on dumping and hazardous fumes on incineration. Since they are hefty, thick, and made of multiple materials, scrap tyres present distinct challenges in recycling and disposal. Global production in 2008 was about 1.5 billion new tyres.

1.1 THE DISPOSAL OF WASTE TYRES:

Waste tyres are generally discarded after only a small amount of rubber is worn away. Even so, these tyres are unfit for further use in the vehicles they were made for. At the same time they are also unwelcome in landfills and have been proven to be an environmental threat. Whole tyres can be used for a number of applications, including artificial reefs, breakwaters, erosion control, playground equipment, and highway crash barriers. Due to the sheer volume of disposable tyres, they take up a great deal of valuable space in landfills. In addition, they have been known to bubble to the surface of landfills as they tend to trap methane gas. This bubbling can contaminate local water systems, as it can damage the landfill liners that are meant to control contaminants. The different stabilizers and flame retardants added to tires have also been known to kill advantageous bacteria in the soil, creating yet another economic problem. Originally, this was the primary form of disposal for scrap rubber (70% in 1977), but due to the decreasing availability of space, this process is no longer considered feasible. Since the inability for landfills to provide adequate space for tyre disposal, other forms of disposal and reclamation have been put into place, using waste tyres as both commodities (new tyres) as well as a form of energy (fuel alternative).

TABLE -1: CHEMICAL PROPERTIES OF CRUMBLE TYRE PARTICLES

Composition	Percentage(%)
Natural rubber	23.1
Synthetic rubber	17.9
Carbon black	28

The casting was done using smallest mixing grade standardized for paving blocks as per IS.

The replacement of sand is done with different percentages of crumble tyre particles.

2. MOULDING AND CASTING

The casting was done using crumble tyre particles sized between 2 to 9mm.The other materials are OPC 53 grade cement, white sand, aggregate (two size -course and fine) and hardner. The vibrating process is done after casting.

Using the grade M30(1:1.76:2.2) the blocks are casted. The thickness of block is 80mm. Area of 1 block is 315mm^2. Shape of block is zigzag. The results were taken at 3,7 and 28 days.

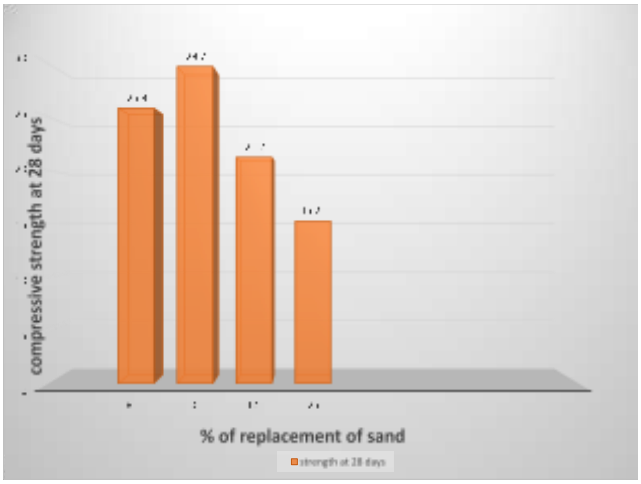
Table-2: Quantity of material.

Sr. No.	% of replacement	Quantity of material			
-	-	Cement	Sand	Aggregate	Crumble tyre particles
1.	0	9.03	15.90	20.04	-
2.	8	9.03	14.62	20.04	1.27
3.	10	9.03	14.31	20.04	1.59
4.	12	9.03	13.99	20.04	1.90
5.	25	9.03	11.92	20.04	3.97

Table-3: RESULT AND ANALYSIS

Sr. No.	Grade	% of replacement of sand	Compressive strength at 28 days (MPa)
1.	M30	0	39.30
2.		8	25.80
3.		**10**	**29.70**
4.		12	21.70
5.		25	15.21

2.1 GRAPH-PERCENTAGE OF REPALCEMNT VS C.S. AT 28 DAYS.



3. CONCLUSIONS

- From the results of tyre waste we can conclude that with increase in percentage of waste crumble tyre particles, compressive strength of mix is decreased rapidly. So that 10% replacement of waste crumble tyre particles is possible.
- Durability of concrete increases with crumbled tyre particles as it also acts as one type of fiber.
- As there is amount of tyre which is high flammable, to avoid fire we can also add fire resistance in small amount.

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