

EXPERIMENTAL WORK ON FIBRE REINFORCED PAVER BLOCKS

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Abstract: The need for the construction sector to be sustained by innovative technology targeted at conserving the natural resources and protecting the environment cannot be overemphasized. The use of plastic wastes as additives in the production of pavement blocks has both engineering and environmental implications. The use of paver blocks produced from plastic wastes is becoming more popular, finding applications in parking areas, compounds, open spaces, streets, and in minor and major roads. The way and manner plastic wastes generated are managed in developing countries is worrisome and disturbing, due to their non-biodegradable nature. Plastic waste is very harmful for the environment and hence, it becomes necessary to use the principle of “3R” (Reduce, Reuse, Recycle). Presently paver blocks are used in outdoor versatility application and also it is used in street road and other construction places. Paver block has low maintenance cost and easily to replace with a newer one at the time of breakage. In spite of use high strength concrete, failure of paving blocks are noticed. For improving compressive strength and flexural strength of paver block this project is necessary. The objective of current work is to increase the physical properties of the concrete by addition of polypropylene fibres and steel fibres. Certain amount of percentage of each material is added to the composition of the concrete block and different tests are conducted on basis of which results are obtained. Provision of 0.5% of polypropylene fibres increase the compressive strength of paver blocks by 26% than normal paver block. Provision of 1% of steel fibres increase the compressive strength of paver blocks by 27%. Provision of steel wires as the steel reinforcement acts as flexural reinforcement for the paver block and increases flexural strength of paver block by 168%. Provision of polypropylene fibre in paver blocks resulted in increase in flexural strength by 62%. There is slight reduction in water absorption of approximately 11% in polypropylene and steel reinforced paver blocks as compare to normal paving blocks.



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INTRODUCTION

Presently paver blocks are used in outdoor versatility application and also it is used in street roads, pedestrian pathways, walkways, parking lots, etc. Concrete blocks are mass manufactured to standard sizes. Hence, they can be easily interchanged. A typical concrete block has two surfaces – one is smooth, and the other is a rough surface. The concrete paving blocks are most suitable for heavy-duty applications, able to support substantial loads and resist shearing and braking forces. The concrete blocks come in various colours. The colour typically come from metallic oxides. However, there is a possibility of these colours to fade away. Hence one needs to be very careful while choosing the colour of the block. Concrete paving blocks are the most preferred choice for laying of pavements, driveways, etc. Paver block has low maintenance cost and easily to replace with a newer one at the time of breakage due to its interlocking construction. In spite of use high strength concrete, failure of paving blocks are noticed. Therefore it is necessary to improve the quality of the paver blocks. The use of plastic wastes as additives in the production of pavement blocks has both engineering and environmental implications. The use of paver blocks produced from plastic wastes is becoming more popular, finding applications in parking areas, compounds, open spaces, streets, and in minor

and major roads. The way and manner plastic wastes generated are managed in developing countries is worrisome and disturbing, due to their non-biodegradable nature. Plastic waste is very harmful for the environment and hence, it becomes necessary to use the principle of “3R” (Reduce, Reuse, Recycle).

LITURATURE SURVEY

1. Effect of Polypropylene Fibres on Abrasion Resistance and Flexural Strength for Interlocking Paver Block - Dr. Jayeshkumar Pitroda, May 2013: The presently paver block is used in various applications like in street road and other construction places. Also we can say that it is partial replacement of concrete pavement. Paver block has low cost maintenance and easily replace with a newer one at the time of breakage. For improving Abrasion Resistance and Flexural Strength of paver block this study is necessary. In this study addition of polypropylene fibres in paver block to show the change in the Abrasion Resistance and Flexural Strength of paver blocks with compare to standard paver block and reduces the maintenance cost of paver block. Also it's helpful to improve the life span of paver block. The paper also shows the cost comparison per block for the each mix proportion.

2. Innovative addition of polypropylene fibre in interlocking paver block to improve compressive strength – Jayesh Pitroda, Jan 2013: The presently paver block is used in outdoor versatility application and also it is used in street road and other construction places. Paver block has low cost maintenance and easily replace with a newer one at the time of breakage. For improving compressive strength and other parameter of paver block this study is necessary. In this study, innovative addition of polypropylene fibers in the top layer (15 mm) of paver block for determining the change in the compressive strength of paver blocks and reduces the maintenance cost of paver block. Also it's helpful to improve the life span of paver block. The presently paver block is used in outdoor versatility application and also it is used in street road and other construction places. Paver block has low cost maintenance and easily replace with a newer one at the time of breakage. For improving compressive strength and other parameter of paver block this study is necessary. In this study, innovative addition of polypropylene fibers in the top layer (15 mm) of paver block for determining the change in the compressive strength of paver blocks and reduces the maintenance cost of paver block. Also it's helpful to improve the life span of paver block.

3. Mechanical Properties of Steel-Fibre-Reinforced Concrete - Khan, I.U.; Gul, A.; Khan,K.; Akbar, S.; Irfanullah , Sept 22 : The rapid increase in a vehicle’s use leads to tire waste, the management of which is of social and environmental concern. The steel wires in a tire have good application in concrete if the proper amount and distribution of steel fibre in the concrete matrix is ensured. This experimental setup evaluates the dosage effect of steel fibre with different ratios on the compressive, splitting tensile, and flexure strength of concrete. The relationship of flexure and compressive strength vs. the dosage of steel fibre is also investigated. A significant enhancement in compressive and flexure strength was found with the use of steel fibre. Moreover, the effect of the length of steel fibre on the mechanical properties of concrete is checked. A 2% dosage of steel fibre with a 300 length showed excellent performance in compression and flexure. The first crack appeared at a 10% greater load than the control specimen. Based on detailed analysis, a 2% dosage with a 300 fibre length can be used for the commercial production of structural concrete..

OBJECTIVES

- To investigate the effect of fiber reinforcement on the mechanical properties of paver blocks.
- To determine the optimum fiber content for achieving improved strength and durability in fiber reinforced paver blocks.
- To assess the impact resistance of fiber reinforced paver blocks and compare it with conventional paver blocks.
- To evaluate the abrasion resistance of fiber reinforced paver blocks and analyze their performance under traffic load.
- To study the flexural strength of fiber reinforced paver blocks and identify the role of fiber type and content in enhancing the strength.

- To examine the crack resistance and crack propagation behavior of fiber reinforced paver blocks under different loading conditions.
- To investigate the effect of fiber reinforcement on the dimensional stability and shrinkage of paver blocks.
- To analyze the water absorption characteristics of fiber reinforced paver blocks and assess their resistance to moisture-induced damage.
- To compare the cost-effectiveness of fiber reinforced paver blocks with conventional paver blocks and evaluate their feasibility for practical applications.
- To provide experimental data and analysis for the development of design guidelines and recommendations for fiber reinforced paver blocks.

Materials

Sr. no .	ingredients	type	source	unit	S.G	quantity
1	Cement	OPC 43 grade	Ultratech	Kg	3.15	390
2	Fine aggregate	Crushed	-	Kg	2.76	750
3	Coarse aggregate(10mm)	Manufactured	-	Kg	2.82	420
4	Coarse aggregate(12mm)				2.84	680
5	Water	Manufactured	-	Kg	1	172
6	Polypropylene fibre	Manufactured	-	%	1.1	0.5
7	Steel fibre	manufactured	-	%		2%

Table 4-Specifications of materials(Industry specified).

PHOTO GALLERY





CONCLUSION

1. Use of polypropylenes fibres in the constitution of the concrete block can enhance the properties of paver blocks which make paver block to sustain for longer period.
2. Provision of 0.5% of polypropylene fibres increase the compressive strength of paver blocks by 26% than normal paver block.
3. Provision of 1% of steel wires increase the compressive strength of paver blocks by 27%.
4. Provision of steel wires as the steel reinforcement acts as flexural reinforcement for the paver block and increases flexural strength of paver block by 168%.
5. Provision of polypropylene fibre in paver blocks resulted in increase in flexural strength by 62%.
6. There is slight reduction in water absorption of approximately 11% in polypropylene and steel reinforced paver blocks as compare to normal paving blocks.

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