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The Application of Waste Masks in Making the Pavement Blocks

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ABSTRACT
In Covid 19 we used masks to protect our self from viral infection. But now a days the people uses masks daily to avoid contamination and protect themselves from the disease and dust. As a mask can't be reused so, it generates a waste. To reduce this waste generated from the used masks we attempted to use them in concrete paver block as one of the ingredient at 20% of concrete. The results of study shows that the strength of the block is considerable and this material can be used as ingredient in paver making.
Keywords:

I. INTRODUCTION

The history of concrete paving blocks can be traced back to the 19thcentury, when paving stones were utilized in European countries for constructing roads, serving as footpaths and tracks for steel-wheeled vehicles. Interlocking Concrete Block Pavement (ICBP) is an environmentally friendly and labor-intensive paving method that is widely employed in many nations to address specific paving challenges. In previous studies it has been found that the use of masks at 16% the strength of paver blocks is so good [1]. Paver block paving is adaptable, visually appealing, practical, and cost-efficient, requiring minimal to no maintenance if properly manufactured and installed.Innovative materials from the recycling of waste materials help in addressing the scarcity of natural resources and provide alternative methods for environmental conservation. The masks used in this study are collected from the nearby area. According to WHO has 89 million masks are needed per month. As the result it affects activities of living things. Hence it necessary to dispose of this discarded face mask properly as per the regulation. By considering all this parameters we used this material in paver blocks.

Various methods used in preparation of the pavement blocks are as follows:
Firstly the masks are collected from various places as like hospitals etc. with proper care by using safety shoes hand gloves and masks. The collected masks were kept pack 72 hours and then it left for 1 hour in sanitization to disinfect. The shredding ids then carried put to cut them in small pieces so that it can be mixed with concrete. The proportion of mask material used in this study is 20% of by volume of concrete, the cement-sand proportion used in this study is 1:2. The mix is poured in the moulds and vibrated for the proper compaction. The strength of blocks for seven, fourteen and twenty eight days are tabulated in table 1.

Before the preparation of paver blocks the various tests are performed on the materials. Such as silt content of sand, fineness of cement gradation of sand etc. and material with the good properties are selected.

TABLE I RESULTS OF COMPRESSIVE STRENGTH.

Sr.no	Timeof curing (days)	Weight of Blocks	Load on Block	Compressive strength	Average
1	7	4.120	399.2	19.96	20.51
2		4.075	411.4	20.57	
3		4.093	420.0	21.00	
4	14	4.166	565.6	28.28	28.02
5		4.148	573.1	28.65	
6		4.000	542.5	27.12	
7	28	4.270	630.9	31.54	32.09
8		4.154	656.7	32.83	
9		4.196	638.4	31.92	

II. ABOUT COMPRESSIVE STRENGTH OF PAVER BLOCKS MADE UP OF WASTE MASKS.

The compressive strength of paver blocks incorporating used face masks as part of their composition has been a subject of recent research, driven by the need to manage the increasing waste generated by disposable masks during the COVID-19 pandemic. Studies have demonstrated that when face masks are properly shredded and integrated into concrete mixtures, they can potentially enhance the compressive strength of the resulting paver blocks. This improvement is attributed to the fibrous nature of the masks, which can act as a reinforcement material within the concrete matrix, distributing stress more effectively and increasing the overall durability. However, the extent of this strength enhancement depends on the proportion of mask material used and the method of incorporation. Optimizing these parameters is crucial, as excessive amounts can lead to decreased workability and potential weakening of the concrete. Overall, while the addition of face masks shows promise in improving compressive strength and contributing to sustainable construction practices, further research is needed to establish standardized guidelines and ensure the long-term performance of these innovative paver blocks.

TABLE III COMPARISON OF COMPRESSIVE STRENGTH OF STANDARD PAVEMENT BLOCKS AND PAVER BLOCK WITH 20% MASK MATERIAL.

Sr.no	Days	Standard paver Blocks	Pavement blocks with mask material
1	7 days	22 MPA	20.51 MPA
2	14 Days	31 MPA	28.02 MPA
3	28 Days	35 MPA	32.09 MPA

The strength of the blocks by using mask material is compared with the regular paver blocks and results are shown in table 2.

Studies have shown that paver blocks made with a 20% percentage of face masks can still achieve acceptable compressive strength, though typically lower than that of conventional paver blocks. For instance, blocks with

face mask content might exhibit compressive strengths in the range of 20 to 35 MPa. While this is generally sufficient for many paving applications, it represents a trade-off between sustainability and structural performance. The reduction in compressive strength is attributed to the different material properties of the face masks, which can affect the bonding and compaction within the concrete mix.

The other tests performed on the paver blocks.

- Water Absorption: The water absorption of paver block after 24 hours kept in water is 6.87%. The percentage of water absorption is less and is does not affect on strength and durability.
- Corner test: The corner test of paver blocks is a method used to assess the quality and durability of the blocks by evaluating their ability to withstand impact and resist breaking or chipping.The paver blocks also pass this testwithout any breaking and chipping at the corner.
- Drop Test:The paver blocks drops from predetermined height which is 600mm to 1200mm from the hard surface. The paver block drop multiple time to see any cracks, damages, and breaking developed. The paver blocks pass this test without getting any cracks, damages and Breaking.

III.CONCLUSION

Pavement blocks made from face masks represent a promising innovation in recycling and sustainable construction. While they offer significant environmental benefits by repurposing waste materials and potentially reducing the carbon footprint, they require thorough testing and validation to ensure they meet the durability, strength, and safety standards of traditional pavement blocks. If proven viable, they could complement traditional methods and contribute to more sustainable construction practices.

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