INTERNATIONAL JOURNAL OF ENGINEERING MANAGEMENT SCIENCE
journal homepage: www.ijems.online/index.php/ijems/index

PREPARATION OFPAVEMENTBLOCK BY USING WATSE MATERIAL

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Keyword

Plastic waste, overburnt bricks, pavement blocks, sustainable construction, waste management, alternative materials, mechanical properties, durability, environmental impact, recycling.

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Abstract

The aim of this project is to innovate in the construction industry by replacing cement with plastic waste in pavement blocks, thus reducing production costs and addressing the mounting issue of plastic waste. With approximately 56 lakh tons of plastic waste generated annually in India and its slow degradation rate, finding sustainable ways to manage this waste is imperative. This project explores the incorporation of plastic waste in varying proportions along with artificial sand and overburnt bricks as coarse aggregates to produce pavement blocks. Overburnt bricks, often deemed unusable in conventional construction due to their dark red color and distortion, possess qualities beneficial for pavement block production, such as increased strength, lower absorption, and higher density. By utilizing these materials, we aim to not only reduce plastic waste but also repurpose overburnt bricks, contributing to a more sustainable and cost-effective approach to pavement block manufacturing.

1 Introduction:

The traditional method of clay brick production involves burning soil, particularly prevalent in countries like Bangladesh and India. However, this process often results in a significant percentage of overburnt bricks, rendering them unsuitable for construction due to their physical characteristics. These overburnt bricks, though discarded in conventional construction, offer potential as a resource in alternative applications. This paper explores the integration of overburnt bricks as coarse aggregates in pavement block production, offering a solution to both the disposal of overburnt bricks and the utilization of plastic waste in construction.

2Literature Review

2.1. Properties of Waste Plastic Bags

Waste plastic bags are a common form of plastic waste generated from various sources such as households, industries, and commercial establishments. These bags are typically made from polyethylene, a polymer that is durable, lightweight, and resistant to moisture. However, their non-biodegradable nature poses a significant environmental challenge, leading to concerns over their disposal and management.

In recent years, researchers and practitioners in the construction industry have explored the potential of using waste plastic bags as a sustainable alternative in construction materials, including pavement blocks. Studies

have shown that waste plastic bags can be processed and incorporated into pavement block mixtures, offering several beneficial properties.

One key property of waste plastic bags is their ability to improve the ductility and toughness of pavement blocks. This is due to the flexible nature of polyethylene, which can enhance the overall durability and impact resistance of the blocks. Additionally, waste plastic bags can act as a binding agent when melted, helping to improve the cohesion and strength of the pavement blocks.

Another important property of waste plastic bags is their resistance to moisture and chemicals. This can help improve the durability and longevity of pavement blocks, particularly in harsh environmental conditions. Additionally, waste plastic bags can reduce the overall weight of pavement blocks, making them easier to transport and handle during construction.

2.2. Properties of Overburnt Bricks

Overburnt bricks are a type of brick that has been subjected to excessive heat during the firing process, leading to a dark red color and distortion in shape. These bricks are often considered unsuitable for use in construction due to their physical characteristics. However, researchers have found that overburnt bricks can be crushed and used as coarse aggregates in pavement block production, offering several advantages.

One key property of overburnt bricks is their enhanced strength and durability compared to conventional aggregates. The high firing temperature during the brick-making process results in a denser and more compact structure, which can improve the compressive strength and load-bearing capacity of pavement blocks. Additionally, overburnt bricks are less absorptive than conventional aggregates, reducing the risk of water damage and deterioration in the blocks.

Another important property of overburnt bricks is their ability to reduce the overall porosity of pavement blocks. This can help improve the resistance of the blocks to water penetration and freeze-thaw cycles, enhancing their durability and longevity. Additionally, overburnt bricks can help reduce the environmental impact of construction by repurposing waste materials that would otherwise be discarded.

2.3. Performance of Pavement Blocks with Waste Materials

Several studies have investigated the performance of pavement blocks incorporating waste plastic bags and overburnt bricks. These studies have found that the use of waste materials can improve the mechanical properties and durability of pavement blocks, leading to potential cost savings and environmental benefits.

One study by Singh et al. (2020) investigated the use of waste plastic bags as a partial replacement for fine aggregate in concrete pavement blocks. The study found that the incorporation of waste plastic bags improved the workability and reduced the water absorption of the blocks, leading to enhanced durability and longevity.

Another study by Rai and Yadav (2019) explored the use of waste plastic and brick waste aggregate in concrete pavement blocks. The study found that the inclusion of waste materials improved the compressive strength and reduced the density of the blocks, making them more suitable for use in construction.

2.4. Environmental and Economic Benefits of Using Waste Materials

The use of waste plastic bags and overburnt bricks in pavement block production offers several environmental and economic benefits. By repurposing waste materials that would otherwise be discarded, the construction industry can reduce its reliance on virgin materials, leading to conservation of natural resources and reduced environmental impact.

Additionally, the use of waste materials can lead to cost savings for construction companies. By using waste materials as alternative resources, companies can reduce their production costs and improve their overall profitability. This can also lead to lower construction costs for consumers, making sustainable construction more accessible and affordable.

Overall, the utilization of waste plastic bags and overburnt bricks in pavement block production offers a sustainable solution to waste management in the construction industry. By incorporating waste materials into construction materials, researchers and practitioners can improve the properties and performance opavement blocks, while also reducing the environmental impact and cost of construction. Further research is needed to explore the full potential of waste materials in construction and to develop standards and guidelines for their use.

3 Methodology:

The methodology employed in this project involves several key steps:

Collection and sorting of plastic waste: Various types of plastic waste are collected and sorted based on their composition and properties Processing of plastic waste: The collected plastic waste is processed to convert it into a usable form suitable for incorporation into pavement block production

Preparation of pavement block mixtures: Different proportions of plastic waste, artificial sand, and overburnt bricks are mixed to form pavement block mixtures

Pavement block production: The prepared mixtures are compacted and molded into pavement blocks using appropriate machinery or molds

Testing and evaluation: The produced pavement blocks undergo rigorous testing to assess their mechanical properties, durability, and suitability for various applications.

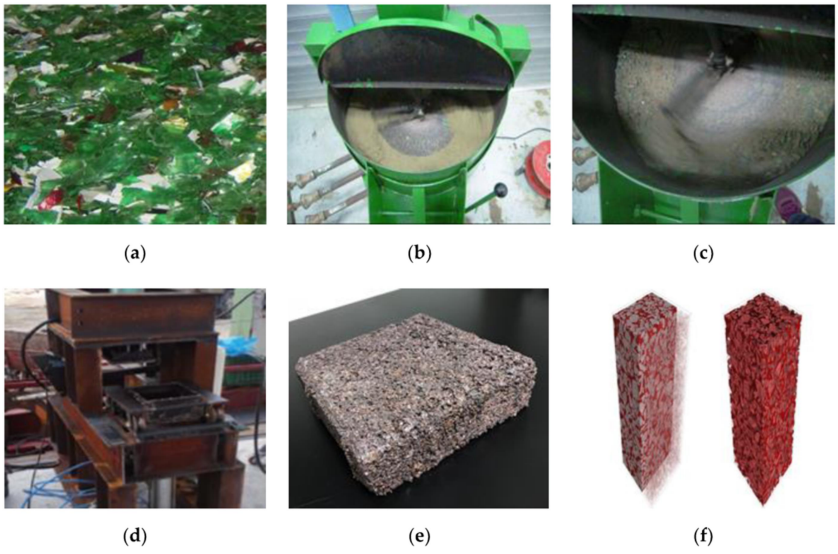

Figure 1 Sustainability of plastic

4 Results and Discussion:

The results of the testing phase reveal promising outcomes regarding the mechanical strength, durability, and overall performance of the pavement blocks produced using plastic waste and overburnt bricks. The incorporation of these materials not only reduces the reliance on conventional materials like cement but also offers environmental benefits by diverting plastic waste from landfills and repurposing overburnt bricks. The discussion highlights the potential scalability of this approach and its implications for sustainable construction practices.

Table 1 Proportion

Sr. no	Grade	Plastic (KG)	Over burnt brick small piece(KG)	Artificialsand (KG)

1	M10	1	3	6
2	M15	1	2	4
3	M20	1	1.5	3
4	M25	1	1	2

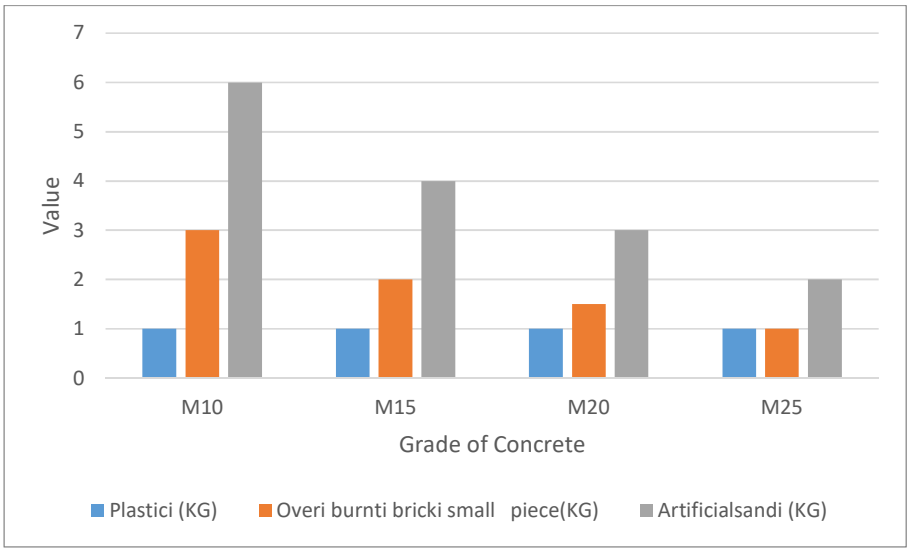

Figure 2 Proportion

5 Conclusion:

This paper presents an innovative approach to pavement block production by integrating plastic waste and overburnt bricks. Through meticulous experimentation and testing, we have demonstrated the feasibility and effectiveness of this approach in producing high-quality pavement blocks while addressing the challenges of plastic waste management and overburnt brick disposal. Moving forward, further research and development in this area could lead to widespread adoption of sustainable construction practices, contributing to a greener and more environmentally conscious built environment.

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