



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 4, April 2025

Volume 14, Issue 4, April 2025**|DOI: 10.15680/IJRSET.2025.1404397|**

Utilization of Waste Plastics in Eco-Friendly Pavement Construction

Dnyaneshwari Kangude, Srusthi Akkalkote, Aditi Maner, Aakansha Raserao, Vaibhavi Gaikwad

Department of Civil Engineering, Jayawantrao Sawant Polytechnic, Hadapsar, Pune, India

Prof. M.D. Thorat

Guide, Department of Civil Engineering, Jayawantrao Sawant Polytechnic, Hadapsar, Pune, India

ABSTRACT: Image inpainting is the process of restoring the lost or damaged regions or modifying the image contents imperceptibly. It refers to the process of filling-in missing data in a designated region of the visual input. In this paper, the technique presented is for detection and removal of text from images. The system detects text using morphological operations, connected component labelling and a set of selection criteria which helps to filter out non text regions. So, the resultant image is the image with only texts. Text Inpainting is done in two steps. The first step detects the text region automatically, without user interaction and in the second step; the text is removed from the image using exemplar based Inpainting algorithm.

KEYWORDS: Plastic, Pavement, Bitumen, Environmental Crisis, Plastic Roads, Laboratory Study, Processes

I. INTRODUCTION

Plastic pollution, particularly from packaging materials, poses severe environmental threats due to its persistence and improper disposal. By 2030, uncontrolled plastic waste could reach alarming levels. Integrating plastic into road construction offers a practical recycling method and reduces reliance on conventional materials. Countries like India, the Netherlands, and Australia have already begun implementing such solutions, showing promising results in terms of road performance and sustainability.

II. LITERATURE SURVEY

Several studies support the viability of plastic-modified bitumen in road construction:

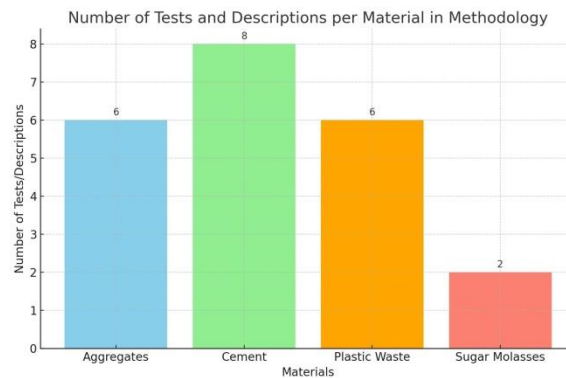
- Hveem (1942): Determined optimal bitumen quantity using surface area calculations.
- Anzar Hamid Mir (2015): Studied viscoelastic properties of binders under different conditions.
- Vatsal Patel et al. (2014): Found EVA and SBS reduce wax-related issues in bitumen.
- Rajasekaran et al. (2009): Improved road performance using plastic-coated aggregates.
- Sasane Neha B. (2015): Recommended 12% HDPE for improved stability and void structure.

III. METHODOLOGY

Materials Used:

- Aggregates: Fine and coarse, tested for impact value, flakiness, and durability.
- Cement: Ordinary Portland Cement tested for color, setting time, compressive strength.
- Plastic Waste: Shredded plastic bottles, bags, and wrappers.
- Sugar Molasses: Used as a binder and additive in the mix.
- Laboratory Testing:
 - Aggregate Tests: Crushing, impact, Los Angeles, flakiness, elongation.
 - Cement Tests: Fineness, soundness, compressive and tensile strength, hydration heat.

- Plastic Waste: Assessed for chemical properties and environmental impact.
- Molasses: Analyzed for sugar content and bonding potential.



IV. EXPERIMENTAL RESULTS

Three samples of modified concrete were tested for compressive strength using a CTM:

- Maximum Strength: 35.80 N/mm² at 376 kN load
- Medium Strength: 34.26 N/mm²
- Minimum Strength: 30.38 N/mm²

These values fall within acceptable ranges for concrete road construction, suggesting the effectiveness of plastic waste and sugar molasses as construction materials.



V. CONCLUSION

The use of plastic waste in road construction provides a dual benefit of reducing plastic pollution and improving pavement performance. This approach enhances the mechanical properties of roads and supports the global initiative toward sustainable development. Future studies should focus on optimizing material proportions and long-term performance monitoring.

REFERENCES

- [1] A. Chavan, "Use of plastic waste in flexible Pavements," International Journal of Engineering Research, vol. 2, no. 4, pp. 23-42, 2013.
- [2] S. Rajasekaran et al., "Reuse of Waste Plastics Coated Aggregates-Bitumen Mix Composite for Road Application," AJER, vol. 2, pp. 1-13, 2013.
- [3] A.N. Dhodapkar, "Use of waste plastic in road construction," Indian Highways Journal, 2008.
- [4] Z.N. Kalantar et al., "Review on waste and virgin polymer in pavement," Constr. Build. Mater., vol. 33, pp. 55-62, 2012.
- [5] A.I. Al-Hadidy and T. QuiYi, "Effect of Polyethylene on flexible pavements," Constr. Build. Mater., vol. 23, pp. 1456-1466, 2009.
- [6] D.N. Little, "Enhancement of asphalt mixtures through recycled polyethylene," ASTM STP, pp. 24-26, 1993.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details