Reuse of Waste Plastic for Road Divider Partition to Prevent High Beam Headlights of Vehicle

Vivek.T Babar[1], Janavi S.Patil[2], Vishal S. kale[3], Namarata S. Patil[4], Sumit V. Pawar[5]
[1]*Professor, Department of Civil Engineering, Rajarambapu Institute of Technology, Rajaramnagar*
[2,3,4,5] *Student, Department of Civil Engineering Student, Rajarambapu Institute of Technology, Rajaramn*

***Abstract*—The increasing accumulation of plastic waste has become a major environmental concern worldwide. This project focuses on the innovative reuse of waste plastic in the manufacturing of road divider partitions to enhance road safety and sustainability. The concept involves processing discarded plastic materials through cleaning, shredding, melting, and molding to create durable and lightweight divider panels. These partitions can be designed to incorporate reflective properties, improving visibility during nighttime and reducing accidents caused by poor illumination.**

The use of recycled plastic offers several advantages, including cost-effectiveness, resistance to corrosion, low maintenance, and long service life compared to conventional materials like concrete or metal. Additionally, this approach helps in reducing landfill waste and promotes eco-friendly construction practices. The project highlights the potential of waste plastic as a valuable resource in infrastructure development while contributing to environmental protection and safer transportation systems.

Overall, and where the width of road divider is wide then the plants are used to be planted on the road divider and If the width of the divider is less at that point this recycled plastic sheets can be used.

***Index Terms*—Waste plastic, Recycling, Road divider partition, Road safety, Plastic waste management, Shredding and melting, Durable material, Accident prevention, Eco-friendly construction**

I. INTRODUCTION-

Plastic waste is a major environmental problem due to its non-biodegradable nature. Reusing waste plastic in road divider partitions is an innovative solution that helps in reducing pollution and improving road safety.

The processed plastic can be used to make lightweight, durable, and cost-effective divider panels with good visibility features. This approach not only manages plastic waste effectively but also supports sustainable and eco-friendly infrastructure development

Objectives-

1. .To Prevent road accident due to High beam headlights of vehicle.
2. To enhance road safety, and improve the aesthetic appeal of the highway.
3. To spread public awareness about the environmental and economic benefits of plastic waste reuse.

Material collection-

4. Waste Plastic (PET, HDPE,
5. LDPE): Collected plastic materials such as bottles, bags, and containers used as the main raw material.

1. Shredded Plastic Pieces:- Plastic waste cut into small pieces to make melting and processing easier.
2. Binding Agents / Additives:-Chemicals added to improve strength, flexibility, and durability of the final product.
3. Color Pigments:-Substances used to give color and enhance visibility of the divider.
4. Reflective Sheets / Reflectors:-Materials attached to the divider to improve visibility at night and prevent accidents.
5. Moulds (Metal/Steel Moulds):-Frames used to shape the melted plastic into required divider forms.
6. Heating Equipment (Furnace/Extruder):Machines used to melt and process plastic at controlled temperatures.
7. Cooling System (Water/Air Cooling):Used to

solidify and harden the molded plastic into final shape.

8. Reinforcement Material (Sand/Fiber/Metal Rods):-Materials added to increase strength and load-bearing capacity.
9. Fasteners (Bolts, Nuts, Anchors):-Used to fix and install the divider partitions securely on the road.

II. PREPARATION

1. Collection and Segregation

Waste plastic materials such as PET bottles, HDPE containers, and LDPE bags are collected from municipal or industrial sources. The plastic is segregated based on type because different plastics have different melting temperatures and properties.

2. Cleaning and Drying

The collected plastic is washed thoroughly to remove dirt, labels, oil, and other impurities. After washing, it is dried to eliminate moisture, which can affect the quality of the final product.

3. Shredding

Clean plastic is fed into a shredder machine to convert it into small uniform pieces (flakes). This increases the surface area and ensures uniform melting.

4. Melting and Mixing

The shredded plastic is heated in an extruder or furnace at a controlled temperature (generally between 160°C to 250°C depending on plastic type). Additives such as stabilizers, pigments, and reinforcing materials (like sand or fibers) are mixed to improve strength, durability, and appearance.

5. Moulding and Shaping

The molten plastic mixture is poured or injected into pre-designed moulds to form road divider partitions of required dimensions. Moulds can be made of steel or metal to withstand high temperature.

6. Cooling and Solidification

The moulded product is allowed to cool naturally or by using air/water cooling systems. Proper cooling ensures the material gains sufficient strength and retains its shape.

7. Finishing and Assembly

After removal from moulds, the surface is finished by trimming edges and smoothing. Reflective tapes, coatings, or reflectors are attached to improve visibility at night. Holes or fittings may be added for installation.

III. TESTING

1. Compressive Strength Test

This test determines the ability of the divider to withstand heavy loads and impacts from vehicles without failure.

2. Impact Resistance Test

It checks the toughness of the material by applying sudden force to ensure the divider does not crack or break easily.

3. Durability Test

The divider is exposed to environmental conditions such as sunlight (UV rays), rain, and temperature variations to evaluate long-term performance.

4. Flexural (Bending) Test

This test measures the flexibility and bending strength to ensure the divider can resist minor deformations without damage.

5. Water Absorption Test

The divider is tested for water resistance to ensure it does not absorb moisture, which can weaken the structure over time.

6. Abrasion Resistance Test

This test evaluates resistance to surface wear due to friction from dust, wind, or minor contact with vehicles.

7. Visibility Test

Reflective materials are tested under low-light and nighttime conditions to ensure proper visibility for drivers.

IV.APPENDIX-

Appendix A:
Process Flow Chart

Collection of Waste Plastic → Segregation → Cleaning
→ Shredding → Melting → Moulding → Cooling → Finishing → Installation

Appendix B: Types of Plastic Used

- PET (Polyethylene Terephthalate) – Used for bottles
- HDPE (High-Density Polyethylene) – Used for containers and pipes
- LDPE (Low-Density Polyethylene) – Used for plastic bags and films

Appendix C: Basic Equipment Used
- Shredder Machine
- Extruder / Heating Furnace
- Moulds
- Cooling Tank/System Appendix D: Advantages
- Reduces plastic waste
- Cost-effective
- Lightweight and durable Appendix E: Limitations
- Requires proper segregation of plastic
- Initial setup cost of machinery
- Temperature sensitivity of plastic Appendix F: Safety Measures
- Use of gloves and masks during processing
- Proper ventilation during melting
- Controlled heating to avoid toxic fumes Appendix G: Applications
- Road dividers
- Median barriers Appendix H: Future Scope
- Large-scale implementation in highways
- Integration with smart reflective technologies

V. CONFLICT OF INTEREST-

The authors declare that there is no conflict of interest related to this project. The study has been carried out solely for academic and research purposes without any financial, commercial, or personal influence that could affect the results or conclusions.

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VII. AUTHORS' BIOGRAPHY-

[1]Professor, Mr. V.T Babar Department of Civil Engineering works as a faculty member in the Department of Civil Engineering. He has expertise in concrete technology, construction materials, and structural engineering. He has guided several undergraduate research and capstone projects and has a strong interest in sustainable and eco-friendly construction practices.

[2]Janavi Patil is a civil engineering student with a keen interest in sustainable construction practices and waste management techniques. She has actively participated in academic projects focused on environmental protection and innovative use of materials. Her area of interest includes eco-friendly infrastructure development and recycling technologies.

[3]Vishal Kale is a dedicated civil engineering student specializing in materials and construction technology. He is particularly interested in the reuse of waste materials in infrastructure projects. His academic work focuses on developing cost-effective and sustainable solutions for modern engineering challenges.

[4]Namrata Patil is an aspiring engineer with a strong interest in environmental engineering and sustainable development. She has contributed to projects related to waste utilization and green construction methods. Her goal is to promote environmentally responsible engineering practices.

[5]Sumit Pawar is a civil engineering student passionate about innovative construction techniques and resource management. He has worked on projects emphasizing the practical application of

recycled materials in infrastructure. His interests include improving durability and efficiency in construction systems.

VIII. CONCLUSION

1. The reuse of waste plastic for road divider partitions is an innovative and sustainable solution to tackle the growing problem of plastic waste while improving road safety. By converting discarded plastic into useful divider structures, this method helps reduce environmental pollution and promotes efficient waste management

2. Plastic-based dividers are lightweight, durable, corrosion-resistant, and require less maintenance compared to traditional materials like concrete and metal. The addition of reflective materials further enhances visibility, helping to reduce accidents, especially during low-light conditions

3. Overall, this approach is cost-effective and ecofriendly, making it suitable for large-scale implementation. It supports sustainable infrastructure development and contributes to a cleaner and safer environment

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