

# Study of Incorporation of Waste Plastic in Road Construction

Abhishek Kamble, Harish Kokani, Abhishek Tapkir, Akshay Bodhale, Lecturer M.A. Dhatunde

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

**Abstract-** Plastic use in road construction is not new. Waste plastic is ground and made into powder; 3 to 4 % plastic is mixed with the bitumen. The durability of the roads laid out with shredded plastic waste is much more compared with roads with asphalt with the ordinary mix. Worldwide, sustainability is the pressing need of the hour in the construction industry and towards this end use of waste material in road construction is being increasingly encouraged so as to reduce environmental impact. In the highway infrastructure, a large number of originate materials and technologies have been invented to determine their suitability for the design, construction and maintenance of these pavements. Plastics and rubbers are one of them. Also considering the environmental approach, due to excessive use of polythene in day-to-day business, the pollution to the environment is enormous. The use of plastic materials such as carry bags, cups, etc. is constantly increasing day by day. Since the polythene are not biodegradable, the need of the current hour is to use the waste polythene in some beneficial purposes. the main aim of this study is to focus on using the available waste/recycled plastic materials and waste rubber tires present in abundant which can be used economically and conveniently. The use of these materials as a road construction proves ecofriendly, economical and use of plastic will also give strength in the sub-base course of the pavement. **Keywords-** abundant, recycled, biodegradable, economical.

**Keywords-** Plastic, Sustainability, rubbers, abundant, recycled, biodegradable, economical.

## I. INTRODUCTION

A material that contains one or more organic polymers of large molecular weight, solid in its finished state and at some state while manufacturing or processing into finished articles, can be shaped by its flow, is called as 'Plastic'. Plastics are durable and degrade very slowly; the chemical bonds that make plastic so durable make it equally resistant to natural processes of degradation. Plastics can be divided in to two major categories: thermoses and thermoplastics. A thermoset solidifies or "sets" irreversibly when heated. They are useful for their durability and strength, and are therefore used primarily in automobiles and construction applications. These plastics are polyethylene, polypropylene, polyamide, polyoxymethylene, polytetrafluorethylene, and polyethylene terephthalate.

A thermoplastic softens when exposed to heat and returns to original condition at room temperature. Thermoplastics can easily be shaped and molded into products such as milk jugs, floor coverings, credit cards, and carpet fibers. These plastic types are known as phenolic, melamine, unsaturated polyester, epoxy resin, silicone, and polyurethane. According to recent studies, plastics can stay unchanged for as long as 4500 years on earth with increase in the global population and the rising demand for food and other essentials, there has been a rise in the

amount of waste being generated daily by each household.

### 1. Aim:

We can reduce the cost of road Construction and reduce the plastic waste from environment.

### 2. Objective:

- To increase the life of road.
- To reuse the plastic waste.
- To reduce cost of road.

## II. METHODOLOGY

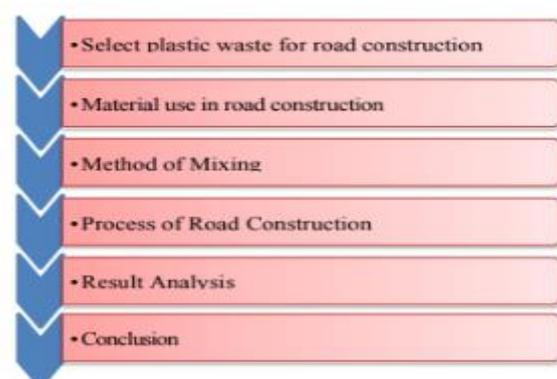


Fig 1. Methodology.

### III. RESULT ANALYSIS

#### 1. Bitumen Test:

TEST	RESULTS	RANGES
Ductility Test	77.50cm	Min 40
Penetration Test	63mm	60-70 mm
Viscosity Test	50.1 sec	-
Softening Test	48.25c	45-600c
Flash Point Test	280c	>65-175c
Fire Point Test	302c	>65-175c

#### 2. Aggregate Test:

STONE AGGREGATE	PLASTIC CONTENT (%)	AGGREGATE IMPACT VALUE	AGGREGATE LOS ANGELES ABRASION VALUE	SPECIFIC GRAVITY	WATER ABSORPTION	STRIPPING VALUE
Without plastic	0	10.79%	12.85%	2.5	3.2%	1%
With Plastic	10	11.70%	9.27%	2.66	2%	NI
	15	8.94%	10.65%	2.7	1.1%	NI

#### 3. Plastic Road Test:

PERCENTAGE OF PLASTIC	MOISTURE ABSORPTION (%)	AGGREGATE IMPACT VALUE (%)	AGGREGATE CRUSHING VALUE (%)	LOS ANGELES ABRASION VALUE (%)	SPECIFIC GRAVITY	STRIPPING VALUE (%)
Control Specimen	1.7	5.43	19.2	13.42	2.45	8%
PP8	NI	4.91	13.33	10.74	2.7	NI
PP10	NI	4.26	9.82	9.41	2.85	NI

### IV. CONCLUSIONS

Plastic has a non-biodegradable material and it has a better bonding between aggregate. By using plastic we are increasing life of road.

Plastic is difficult to reuse that's why using plastic in road it is a best method to reuse plastic. Plastic is water resistant that's why plastic road can resist rainwater and it was help to easily drain off rainwater. Use of the innovative technology not only strengthen road construction but also increased the life Help to improve the environment Plastic will increase the melting point of the bitumen.

### REFERENCES

- [1] Jenna Jambeck (2017) "Challenges and emerging solutions to the land-based plastic waste issue in Africa". Jambeck, J., Marine Policy (2017)
- [2] (EPA, Summary of Expert Discussion Forum on Possible Human Health Risks From Microplastics in the Marine Environment, EPA Reports, (2015).
- [3] R. Vasudevan, (zon) "A technique to dispose waste plastics in an eco-friendly way-Application in construction of flexible pavements" Construction and Building Materials, Vol. 28 Department of Chemistry, Thiagarajar College of Engineering Madurai, Tamil Nadu, India, pp 311-320
- [4] Zahra Niloofar Kalantar, Mohamed Rehan Karim, Abdelaziz Mahrez A review of using waste and virgin polymer In pavement – Construction and Building Materials 33 (2012) 55-62
- [5] Amit Gawande, G. Zamare, V.C. Renge, Saurabh Tayde, G. Bharsakale-An overview on waste plastic utilization in asphaltting of roads – Journal of Engineering Research and Studies volume 3, 2012/01-05.
- [6] S Naveen Bheemal "Use of Waste Plastic in Flexible Pavement Construction" S JPSET: Vol. 10, Issue Supplementary, ISSN: 2229-7111 (Print) and ISSN: 2454-5767 (Online).