**Managing smart cities by utilizing plastics wastage as resource inventory in Indian construction industries towards waste optimization and environment protection**

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**Abstract**

As human communities grow larger and larger, the problem of waste management becomes one of urgent need that should be solved. Recycling and reusing of the waste materials is an efficient measure in management of the waste materials, which in addition to preventing the pollution, it conserves natural resources. Today, plastics are used in almost every area, from small bottle caps, to large containers, such as laundry baskets and garbage pails. In present time we produce and use twenty times more plastic amount than we did five decades ago. By using plastics waste coated aggregate bitumen mix technology several roads have been laid in the States of Tamil Nadu, Maharashtra , Pondicherry, Kerala ,Andhra Pradesh and Goa.

**Keywords:** Bituminous road construction, land filling, incineration, biomedical plastic wastes

**SYNCHRONIZING PLASTIC WASTE WITH CONVENTIONAL ROAD MATERIALS**

Indian consumption of plastics will grow 15 million tons by 2015 and is set to be the third largest consumer of plastics in the world. Around 55% is being used for packing. They are mostly dropped and left to litter the environment, after the contents have been consumed. The littered plastics, a non biodegradable material, get mixed with domestic waste and make the disposal of municipal solid waste difficult. The municipal solid waste is either incinerated or land filled. Both disposal methods are not the best ways to dispose the waste and it causes both land and air pollution. Moreover, if municipal solid waste contains PVC waste, when burnt, it produces toxic gases like dioxins. Disposal of plastic wastes in an eco friendly way is the main thrust area of today’s research works.

Use of plastic along with the bitumen in construction of roads not only increases its life and smoothness but also makes it economically sound and environment friendly. Plastic waste is used as modifier of bitumen to improve some of bitumen properties Roads that are constructed using plastic waste are known as Plastic Roads and are found to perform better compared to those constructed with conventional bitumen. Further it has been found that such roads were not subjected to stripping when come in contact with water. Use of higher percentage of plastic waste reduces the need of bitumen by 10%. It also increases the strength and performance of the road.

**JAMSHEDPUR UTILIZING BITUMEN TECHNOLOGY FOR PLASTICS ROADS**

Disposal of waste plastic is no longer a problem in the steel city with Jamshedpur Utility and Services Company (JUSCO) using bitumen technology on waste plastic, ranging from polybags to biscuit packets, for constructing roads. JUSCO, a 100 per cent subsidiary company of Tata Steel which maintains and provides municipal services in Tata command area of the city, has constructed 12-15 Km road in the steel city as well as Tata Steel Works besides widening 22 roads using the environment-friendly technology of utilizing waste plastic. Jamshedpur is the only city in eastern India where bitumen technology (Dry Process) patented by Thiagarajar College of Engineering (TCE), Tirupparankuram, Madurai, has been implemented on accumulated waste plastic for the first time. There is no maintenance cost involved for the first five years. For every stretch of such one km long and four meter wide road, one ton of bitumen costing Rs 50,000 is saved. The use of bitumen has been reduced by 7 per cent ever since JUSCO began using waste plastic in road construction work. The quality and longevity of roads made of waste plastic-aggregate-bitumen was two times better than bitumen road. Besides being water resistant, it has better binding property, higher softening point, can withstand high temperature and higher load, has lower penetration value, costs less as compared to bitumen road and has no toxic gas emission, Due to the JUSCO initiative, the city will now have strong, durable, eco-friendly roads which will also relieve the residents from the sight of heaps of plastic waste.

**CONCLUSIONS**

Developed countries realized that recycling of plastic wastes is a necessary step to control environmental pollution and make use of waste material as new resources. So, one method of saving the environment, of this waste bad effect, is to use these waste in any useful application especially applications of low cost. During the latest decades many researchers have centered their works in using plastic waste as raw materials from second degree as an alternative to natural resources. The use of plastics coated aggregate for asphalt pavement allows the reuse of plastics waste. Plastics, are versatile packing materials and commonly used by man but they become problem to the environment. It has been proved by various studies that the coating of plastics & rubber reduces the porosity, absorption of moisture and improves soundness. Hence the use of waste plastics & rubber tyres in the form of powder for flexible pavement material is one of the best methods for easy disposal of wastes. Hence the use of waste plastics for pavement is one of the best methods for easy disposal of waste plastics.

Today, the availability of the waste plastics is enormous, as the plastic materials have become part and parcel of daily life. If not recycled, their present disposal is either by land filling or by incineration. Both these processes have certain impact on the environment. Under this circumstance, an alternate use for the waste plastics is the need of the hour.

This paper highlights latest developments in various methods of disposal of plastic waste in construction of roads.