

PLASTIC ROADS MADE IN INDIA RECYCLING WASTE

By Daisi Mamani Suaquita

The Indian government announced in November 2015 that plastic roads would be the default method of construction for most city streets, part of an overhaul of the country's roads and highways. Urban areas with more than 500,000 people are now required to construct roads using waste plastic along with hot mixes for constructing bitumen roads within 50 km of periphery. To date, more than 5,000 kilometers of plastic roads have been laid in at least 11 States.

In India, 40 percent of the country's municipal waste remains uncollected, according to the OECD, and much of the garbage is made up of plastic. The country's Central Pollution Control Board says more than 15,000 tons of plastic waste are generated daily, posing huge environmental, social, and economic challenges.

The technology of Plastic Roads was developed by the [Plastic Man of India, Rajagopalan Vasudevan](#), Professor of Chemistry at the Thiagarajar College of Engineering, Madurai. He has devised a way to transform common plastic litter, not only thicker acrylics and bottles but also grocery bags and wrappers, into a partial substitute for bitumen in asphalt. He travels throughout India instructing engineers how to apply his method. The college holds a patent for his technique but often licenses it for free. The Central Pollution Control Board and the Indian Roads Congress, two leading government bodies, have endorsed the method.

The roads constructed using this technology are of better quality and do not require maintenance in the first five years. This technology costs less as compared to bitumen road and has no toxic gas emission. Besides being water resistant, these roads have better binding property, higher softening point and can withstand high temperatures and higher loads. Rainwater does not seep through these roads because of the plastic in the tar and these results in fewer repairs.

The process of the Plastic Road method consists in the following steps:

- The plastic waste is shredded into small pieces using shredding machines;
- The shredded waste is then added to the blue metal, which has already been heated to around 170 degree Celsius;



- The plastic is mixed with the heated blue metal, thereby melting it with the stone;
- Then, bitumen is added and mixed with the plastic-coated stone, which would be used for road construction.

Some of the benefits of this method are: the process is easy and does not need any new machinery. For every kilo of stone, 50 g of bitumen is used and 1/10th of this is plastic waste, reducing the amount of bitumen being used; Plastic increases the aggregate impact value and improves the quality of flexible pavements; Produce stronger roads with increased *Marshall Stability Value* (a benchmark for identifying the strength of the road); Better resistance to rain water and water stagnation; Increased binding means better bonding of blue metal and bitumen; Reduction in the percentage of pores and hence less rutting.

Jamshedpur Utilites and Services Company (JUSCO) has undertaken an initiative to use plastic waste for road construction in Jamshedpur and in 2016, 50 km of roads has been constructed under this project. For every 1 km long and 4 m wide of road using this technology, 1 ton of bitumen costing \$751,500 is saved.

In addition, this method can accommodate the multilayered wrappings often used to pack snacks such as chips and cookies. These wrappings (typically consisting of a layer each of plastic, polyester, and aluminum) make up an increasingly large volume of waste in India. They're about impossible to recycle, but they can easily be shredded and reused with this method.

An important advantage of this method is that urban local bodies, which are usually short of financial resources, can make money by selling the plastic waste generated by cities to road developers, signing memorandums of understanding with the road construction companies

In the short run, the bigger challenge for plastic roads is execution, because it requires an important support of public and governmental bodies. Tamil Nadu was the first state in India to actively develop a cottage industry around shredded plastic. Most plastic shredders are women who buy subsidized shredding machines and sell their finished product for profit. Job creation for waste pickers and small entrepreneurs is an added benefit of the roads.

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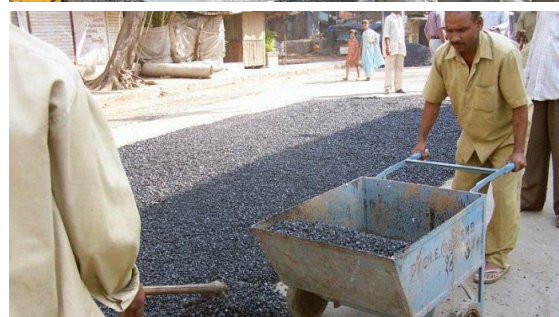
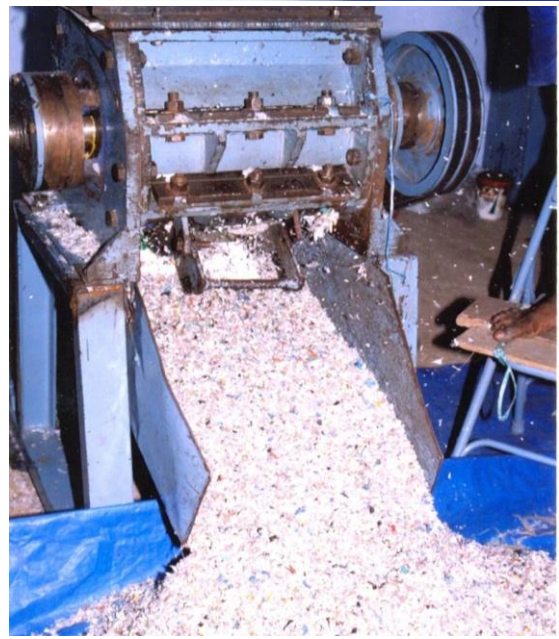
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