



The Sustainable Road

While roads and highway development now forms the crux of India's ongoing thrust on overall infrastructure development, MICHAEL KEDEM, Director, i-Tec India, believes the real challenge is to create new, faster, greener and cleaner ways to do it.

A well-developed network of efficient roads is crucial for the growth of any global economy, and India is no exception. With an extensive road network of a whopping 3.3 million km, India today, has the second highest road density in the world after the US. According to the latest government estimates, Indian roads carry about 61 per cent of freight and 85 per cent of passenger traffic. However, all the highways and expressways that together constitute about 66,000 km (only 2 per cent of all roads) carry 40 per cent of the road traffic. In such a scenario, soil stabilisation techniques can revolutionise the method of road construction in India and, deliver superior quality, environment-friendly roads at a fraction of the cost. And, with such techniques, Michael Kedem, Director, Innovative Technology Enzyme Company of India Pvt Ltd (i-Tec India), envisages a phenomenal infrastructure growth in India over the coming years, as he tells CW.

Stabilising soil

There are several non-toxic and non-polluting green products that are approved by the Indian Roads Congress (IRC), in addition to a host of countries around the globe. The ideal technology is a highly concentrated, liquid soil stabiliser and re-conditioning solution based on a bio-enzymatic soil stabiliser that can be used with onsite local soil. Ensuring smooth working, the technology is formulated with an enzyme-rich material that has been tai-

lored to provide the 'lock' for numerous soil materials and promote the desired alteration of their properties, causing rapid cementation to occur. It is also blended with a biodegradable surfactant that reduces surface tension, bringing the enzymes in closer contact with soil materials. The chemical reaction accelerates the breaking down of organic materials, changes the soil's chemical composition and alters its engineering properties. This speeds up the bonds of the soil particles by ion exchange to a semi-rigid dense permanent base, resulting in a reduction of the crust thickness of the flexible pavement structure and thus leading to cost reduction.

Add-on

Suitable for use in the construction of a wide variety of road projects including highways; rural, township, and secondary

Bio-enzymatic soil stabilisers require to be used in a small quantity per square metre.



roads; airport runways; road shoulders; recreation paths and parking lots. The technology also offers a slew of other important benefits. First, it can be used across all types of soil in urban and rural areas. As it treats the organic matter within the soil at a particle level, a very small quantity per square metre is required. Significantly, soil treated with such techniques renders improved density values by reducing void ratios to a large extent, which in turn results in an overall improvement in the California Bearing Ratio (CBR). Tests done on finished roads that have used such techniques have shown much-improved CBR ratios, sometimes in the range of hundreds and thousands in per cent terms (in some cases) depending on the soil type. Further, they also facilitate higher soil compaction densities and replace the soling (GSB layer) and WMM layer of conventional road structures, while reducing the crust thickness of asphalt layers. This in turn improves overall road quality and provides additional benefits such as not cutting mountains, etc.

Better roads, lower costs

While better quality roads are definitely the need of the hour in both rural and urban areas, we need to ascertain the cost implications of using this technology vis-à-vis conventional methods of road construction. Such techniques ensure huge savings in both the construction and maintenance of roads. The overall cost reduction would be anywhere between 10 and 15 per cent of the total cost of construction, while the maintenance cost would be reduced by approximately 50-75 per cent. Moreover, as there is an achievement in superior strength in the base level of a road developed with such technology, further reduction in the bitumen layer is also possible, resulting in an additional saving in surfacing costs. As such technology allows for far greater use of onsite materials, it also eliminates to a large extent the need to indulge in the costly exercise of transporting borrow pit materials. With low cost, it allows for many more kilometres of roads within the same budget, ensuring surplus funds. Unlike conventional stabilisers, these techniques involve no working period or time limit, and their application requires no specialised machinery or construction procedure; the standard method of construction is followed using a water truck, motor grader and a compactor or grader.



Reducing carbon footprint

Using a completely eco-friendly, non-toxic technique, materials formulated using vegetable extracts and sugar molasses help significantly reduce the carbon footprint in infrastructure projects. Interesting attributes of such techniques have been achieved by eliminating the need for different layers that are mandatory in conventional road construction. In the latest available materials, just a couple of layers are enough, eliminating the need for multiple layers. Further, the increased use of onsite materials results in about 9,000 fewer tonnes to transport. Thereby, we can save about 230 truckloads of transporting materials to and from the site, or about 80,000 kg of carbon dioxide. As such techniques reduce construction by up to 50 per cent and enable the recycling and utilisation of a wide variety of waste materials, we also get significant additional reduction in the carbon footprint of the heavy machinery onsite.

Moving forward

Currently, materials supporting this technology are being imported into the country. In the same context, our flagship material - Zym-Tec - has also been well received in India, thus far. Enzyme-based, in its pure form, this material is a highly concentrated liquid, and we are further diluting and mixing it in India. We are using it in about 15 different locations with the soil stabilisation technique, including highways, airport runways and




The application of these stabilisers involves the standard procedure of road construction.



These stabilisers strengthen the base level of soil, thereby ensuring reduction in the bitumen layer.

rural roads. For the private sector, this can serve as a comprehensive solution to the specialised needs of BOT/BOOT projects, in addition to real-estate developers looking for long-term solutions for their on-going realty projects like townships that need a well-developed network of quality internal roads, pathways and jogging tracks. In terms of the public sector, the development of roads in rural areas to improve connectivity remains a big focus along with the many roads and highway projects that have mushroomed across metros and urban areas.

A new mindset

I believe it's more of a challenge to change the mindset of decision-makers compared to entering a competitive market. The accepted method of constructing roads hasn't changed much in the past 2,000 years since the Romans built the first roads. The real challenge here is to introduce a new, faster, greener and cleaner method that is radically different from the conventional method of road construction. Giving an idea of how fast this process is, a 4 km, standard rural road in Maharashtra – the pilot project executed with this technique – took about 14 days to complete from start to finish. So, given the technology and means at our disposal, it will not be that tough to lead India to a new ecological infrastructure revolution and its people, to a better quality of life. 




About the author:

MICHAEL KEDEM, the promoter of i-Tec India, came to India in the mid-1990s and has vast managerial experience in establishing businesses and factories in India for the past 15 years.

During this period, Kedem has gained experience in importing, manufacturing and exporting raw materials and finished products from SEZs.

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