

Hon. Minister Ntin Gadkari – Adopt New Technologies for Roads



NEW DELHI: February 2018, for the umpteenth time, Road's Hon. Minister Ntin Gadkari has advocated and encouraged his officials to look outside the box and to be more innovative.

There is an urgent need to give up conservative approach in governance and adopt new technologies to push the pace of highway construction, road transport and highways Hon. Minister Nitin Gadkari told his officials Monday.

He was speaking at the launch of the Indian highways capacity manual that talks about road construction code, traffic management and construction capacity of highways. "Our officials and department lag behind the world when it comes to construction of roads. The speed of highway construction is not as high as it should be," he said. "We must give up our conservative approach towards adopting new technology. Why can't we have the same road construction pace as the US, Germany and other western countries."

Over the centuries, India have certainly introduced a number of firsts in the world, including the Decimal System, Binary Code, cataract surgery, plastic surgery, steel, fibre optics and not to mention the chess board.

The Indian Road Congress was established as a society in 1937. Soil stabilization and the Macadam construction methodology were introduced in

India in 1943. Since then, there has been little advancement in adapting to new technologies for road construction. The National Highway Authorities of India was constituted in 1988 and became operational in February 1995. India has a road network of more than 6,603,096 Kms of road, the second largest in the world. With one of the fastest growing economies in the world, over the last 10 years, it is understandable why the Hon. Minister Nitin Gadkari is showing a little irritation pertaining to the slow progress of road construction. In 2015 at the EXCON, the minister set a target to build 100 Kms of road per day by 2016. The only way to achieve this target was by bringing in superior stabilizing technologies, stated the Minister.

Innovative Analytical Characterization of SoilTech MK. III Polymer Stabilized Geomaterials for Unique Design and Construction of Pavements - ¹Dr. John Mukabi and ²Nick Muller

Stabilization techniques have long been used for purposes of enhancing the geotechnical engineering properties of pavement geomaterials. These techniques mainly include mechanical, traditional hydraulic (cement, lime, fly ash etc), bituminous, polymer and other non-traditional liquid chemical stabilization. Liquid chemical stabilization has yet to gain popularity due to lack of proper scientific and engineering background and pragmatic performance justification based on enhanced Research and Development (R&D). In due consideration, the main challenges associated with stabilization that require rigorous R&D include:

1. developing stabilization techniques that can be effectively useful for inferior construction materials that are usually rendered useless;
2. determining optimum batching ratios for varying geomaterials to enhance mechanical stabilization prior to application or addition of stabilizing agents;

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3. selection of appropriate stabilizing agents that are chemically compatible with the applicable geomaterial;
4. determining the optimum content to be added to the geomaterial in order to achieve optimally enhanced physical and mechanical properties whilst minimizing associated detrimental effects such as cracking;
5. developing sophisticated and advanced analytical modelling techniques that can effectively characterize the behaviour of stabilized geomaterials both quantitatively and qualitatively. In this Study, sophisticated analytical models are employed in characterizing and fostering the salient properties of SoilTech Mk. III polymer stabilizing agent with respect to theoretical and pragmatic consideration including:
 - a. interlayer nano-polymer migration effects;
 - b. elastomeric properties;
 - c. enhanced response to compaction effects;
 - d. enhanced tensile characteristics;
6. increased resilience to deformation;
7. expanded range of stress-strain elastic limits; and,
8. appreciable resistance to cracking under excessive loading

Pavements in South Africa, and is currently represented in India by J.V partner Kaveri Ultra Polymers.

SoilTech was purposely designed and manufactured to address these challenges and to leapfrog somewhat archaic road stabilization technologies.

- **1998** the first commercial application of SoilTech Mk. I was in 1998. Initially the product was developed as binder for rural roads. Over the next couple of years, Polyroads modified SoilTech with new cross-linking polymers to improve compressive strengths – **SoilTech Mk. I.**
- **2006** major technology advances saw the introduction of long-chain polymers into SoilTech and thereby adding a second performance dimension to SoilTech. The high CBRs achieved in materials with SoilTech were complimented with new and highly improved elastic modulus in the stabilized pavements, allowing greater flexural strengths and loading capabilities, not to mention improved longevity in the pavements – **first of a kind - SoilTech MK. II.**
- **2010** Polyroads chemical engineers

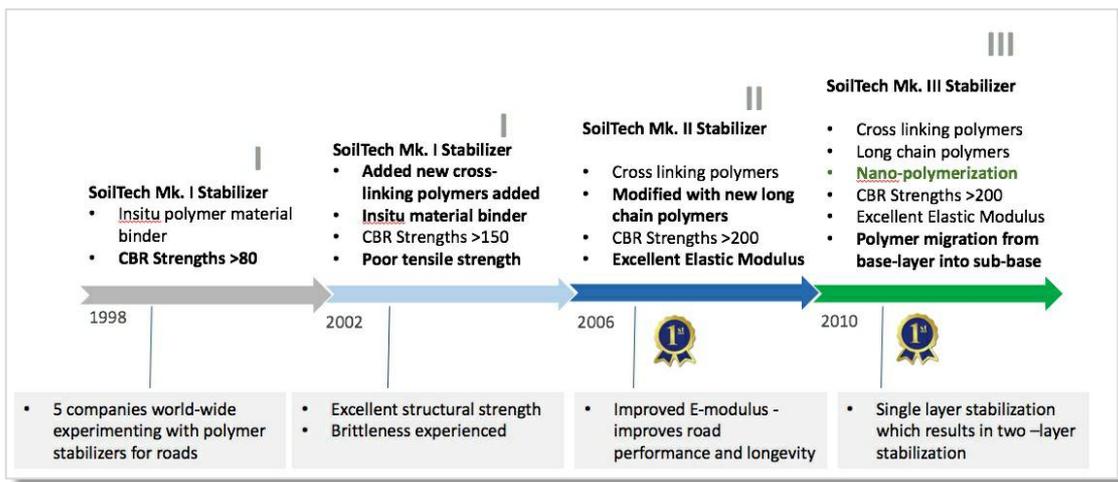


Table1. Chronology of 3rd Generation Stabilizer

SoilTech Mk. III - a third generation soil stabilizer, was developed 20 years ago in by Polymer

introduced nano-polymerization into SoilTech. The specific nano-polymers being substantially smaller than the normal SoilTech polymer particle, allows for easier sliding velocity on capillary adhesion in the materials.

Specifically engineered surfactants, mixed with the nano-polymers, further reduces tensions as SoilTech nano-particles migrate from the stabilized base-layer into the sub-base, resulting in two-layer stabilization. **First of a kind – SoilTech Mk. III.**

Polyroads' engineers have developed appropriate methods of design involving advanced geotechnical engineering concepts related to the Elastic Limit Design Criterion (ELDC) and Modulus-Thickness Design Criterion (MTDC). The prowess of these methods, developed for both unreinforced and stabilized pavements, with fundamental objectives of achieving prolonged pavement design life through protracted maintenance of the elastic properties, is demonstrated by ensuring that the impact of imposed loads and environmental changes is contained within the linear elastic region. The most distinguished advantage of the ELDC and MTDC, is that all design parameters derived are based on only three primary parameters; namely, the pavement thickness, elastic modulus and the cumulative ESALs (Equivalent Single Axle Loads), to which all other parameters are correlated. Non-linearity is analysed based on the soils mechanics concepts of the KHSSS (Kinematic Hardening Small Strain Stiffness). Due to the successful application and cost-construction time effectiveness of these methods of design, Polyroads' engineers will advise on the application of the elastic limit stress-strain and modulus- thickness ratio concepts as the



Pic 1. Bangalore – Embassy Springs Roads

appropriate quasi-mechanistic methods of design for polymer stabilized pavement geomaterials.

In excess of 20 roads have already been constructed in India, using SoilTech Mk. III stabilizers.

SoilTech Mk. III Stabilizer enables:

- I. reduction in aggregate required for layered works
- II. reduces construction time
- III. reduces construction costs
- IV. improves road longevity
- V. Improves service delivery to the community
- VI. Improves contractor margins
- VII. Reduces maintenance

Contractor Training

Extensive contractor training is currently underway in the state of Karnataka, where Kaveri Ultra Polymer staff are advising construction company on all aspects of SoilTech Mk. III pavement stabilizing technologies.

A training roadshow is planned to selected provinces in India, in the very near future.

Both the IRC and NHAI have encouraged and authorised municipalities and states to allocate budget for new stabilization technologies.

iTRARR 2018 - International Conference – Mombasa, Kenya

The Kenya Roads Board in collaboration with Material Testing and Research Division will host the 2nd International Conference on Transport and Road Research, dubbed iTRARR 2018 from 11 – 14 June in Mombasa, Kenya.

Dr John Mukabi will be presenting a Paper, namely, Innovative Analytical Characterization of SoilTech MK. III Polymer Stabilized Geomaterials for Unique Design and Construction of Pavements, at the conference.

<http://www.transportconferencekenya.org/#about>