Introduction to Microsurfacing with fibers for Maintenance of Highways/Major Bridges /Flyovers/ Runways/ Concrete Roads

About Us

Markolines was founded in 2002. We started out as a road marking company. Over the years, we have transformed this single product company into a leading Highway O&M service provider.

Today, we have a complete gamut of products under four verticals. We have established a well-equipped Technology Centre that steers the Company's goal of enhancing the on-ground performance of the technology.

We place our customer at the heart of everything we do and in all our projects, we adopt a customer-focused approach, committed to delivering a service that directly addresses the needs of our clients and the society we work in.

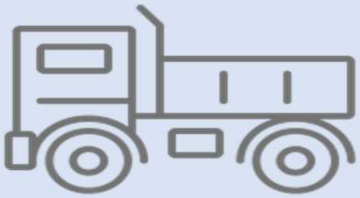
Our Offerings

Highway Operations	Highway Maintenance	Specialised Maintenance Services
•Toll Operations •Route Patrolling •Incident Mgmt	•Routine Maintenance •Preventive Maintenance •Major Maintenance & Repairs	•Microsurfacing •Base and Subbase Stabilization •CIPR & CCPR •Full Depth Reclamation (FDR) •Rehabilitation with Glass Grid. •Hot in Plant RAP

OUR EXPERTISE IN MICROSURFACING

Executed more than 113.70 LAC SQM (equivalent to 2900 lane Kms) of Microsurfacing

Technology Centre for pavement preservation solutions



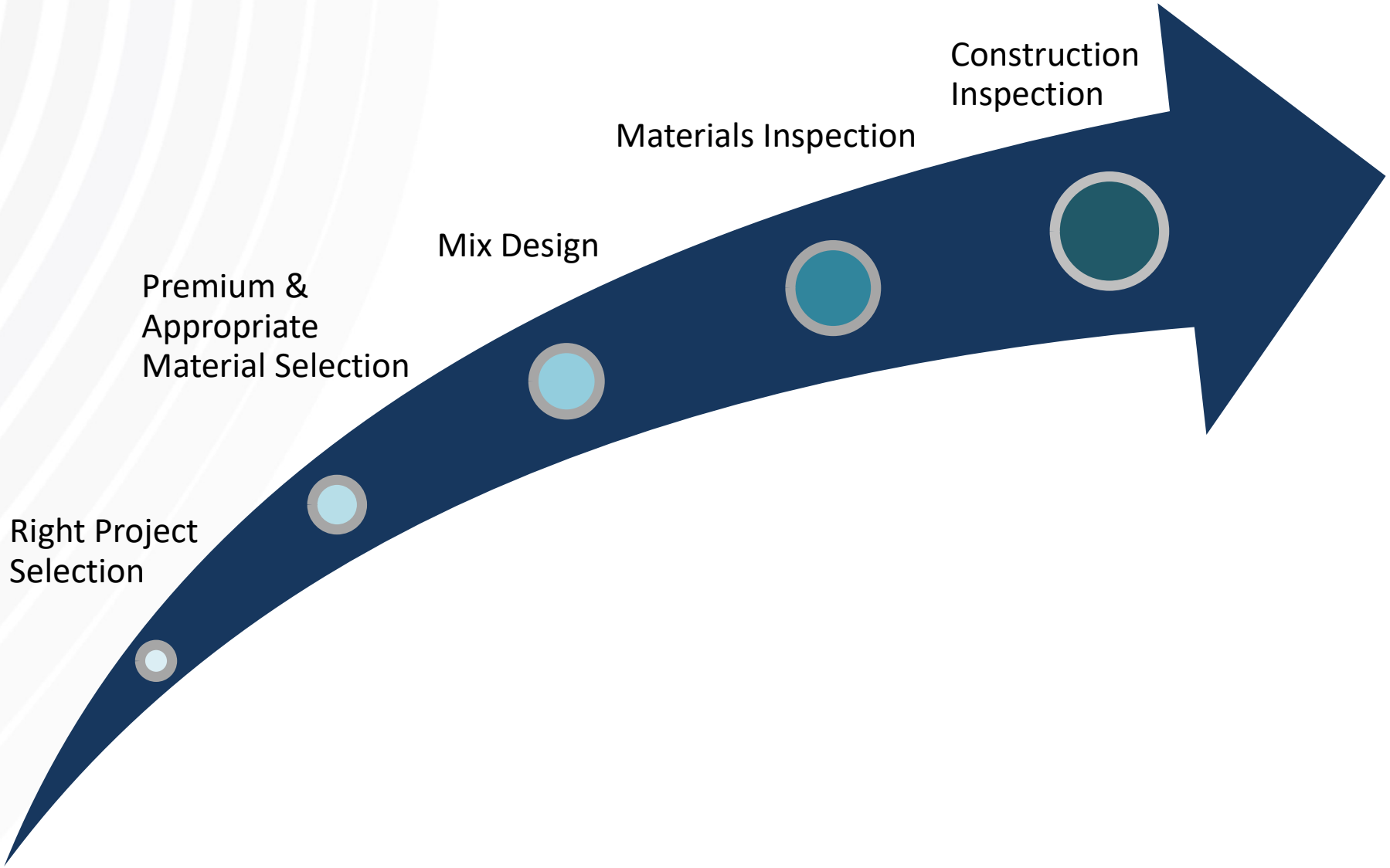
Ownership of Microsurfacing pavers

Tie-up with international organizations such as Bergkamp, Ingevity and Owens Corning for technical back-up

Experienced & Well-Trained Execution Team

Quality of finished Microsurfacing project greatly depends on the quality of Emulsion and Aggregates..

WHY US


Right Project Selection
Premium & Appropriate Material Selection
Mix Design
Materials Inspection
Construction Inspection

INTRODUCTION TO MICROSURFACING- ROADS PRESERVATION TREATMENT

DEFINITION

It is an eco-friendly laboratory-designed mixture of Polymer modified emulsion, premium aggregates, mineral filler, water and other additives accurately proportioned, mixed and uniformly spread over a properly prepared surface

TYPES

Available as Type II (4 to 6 mm thick) and Type III (6 to 8 mm thick).

USES

Can be used both for Preventive Maintenance (to prevent surface distresses on good pavement) and Corrective Maintenance (to correct surface distresses like rutting on older pavement)

APPROVALS

- IRC: SP: 81-2008 : Tentative Specifications for Slurry Seal & Microsurfacing.
- Ministry of Road Transport & Highways (MoRTH – Fifth Edition (2013), Clause – 514)
- IRC:SP:100-2014 : Use of Cold Mix Technology in Construction of Road & Maintenance by Emulsions.
- MoRTH letter dated 28th Sep. 2016 mandating use of Micro Surfacing for renewal course , maintenance and repair on National Highways

MICRO SURFACING COMPONENTS

PREMIUM AGGREGATE

STONE DUST

CEMENT

MODIFIED EMULSION

ADDITIVE

WATER

HISTORY

1960's

Developed in Germany in 1970's for Rut filling of Autobahns

1980's

Introduced at International Slurry Surfacing Assn. - ISSA in U.S. by Dr. Raschig as Ralumac system and is now extensively being used worldwide

2000's

Introduced in India in 2000, acceptance was limited as necessary guidelines for Microsurfacing was approved in 2008 vide IRC:SP:81 and final specifications vide SP:100:2014.

MICROSURFACING MIX DESIGN

Particulars	Type II 4 – 6 mm	Type III 6 – 8 mm
Premium Quality Aggregate	8.4 to 10.8 kg per sqm.	11.1 to 16.3 kg per sqm.
Binder (Polymer Modified Emulsion)	13 – 15% by weight of aggregate	10 – 15% by weight of aggregate
Additive	Up to 2% by wt of aggregate	Up to 2% by wt of aggregate
Cement/Filler	0.5 – 2.0% by weight of aggregate	0.5 – 2.0% by weight of aggregate
Water	13 – 15% by weight of aggregate	10-15 % by weight of aggregate

ADVANTAGES

- Quick Application with minimum traffic hold up and traffic opening in max 2 hrs, causes minimum traffic disruption. Night placement is possible.
- Cost effective as compared to Hot-Mix (BC) and extends life span of the road.
- Rectifies surface defects and Ruts including minor cracks, hungry surface due to ageing & surface Oxidation.
- Environment friendly - Nonpolluting for environment since no heating or hot paving required
- Restores surface structure, slows the age hardening in the original road surface.
- Microsurfacing can also be done on concrete pavement to improve the riding quality. It reduces Tyre burst of Cars and ensure smother ride with less noise.
- Seals the surface and prevents ingress of water as it is a dense bitumen rich mix having polymer bitumen from 6.8% to 7.5%.
- Does not increase pavement height significantly (Road furniture, drainage is not disturbed). Saving of Natural resources.

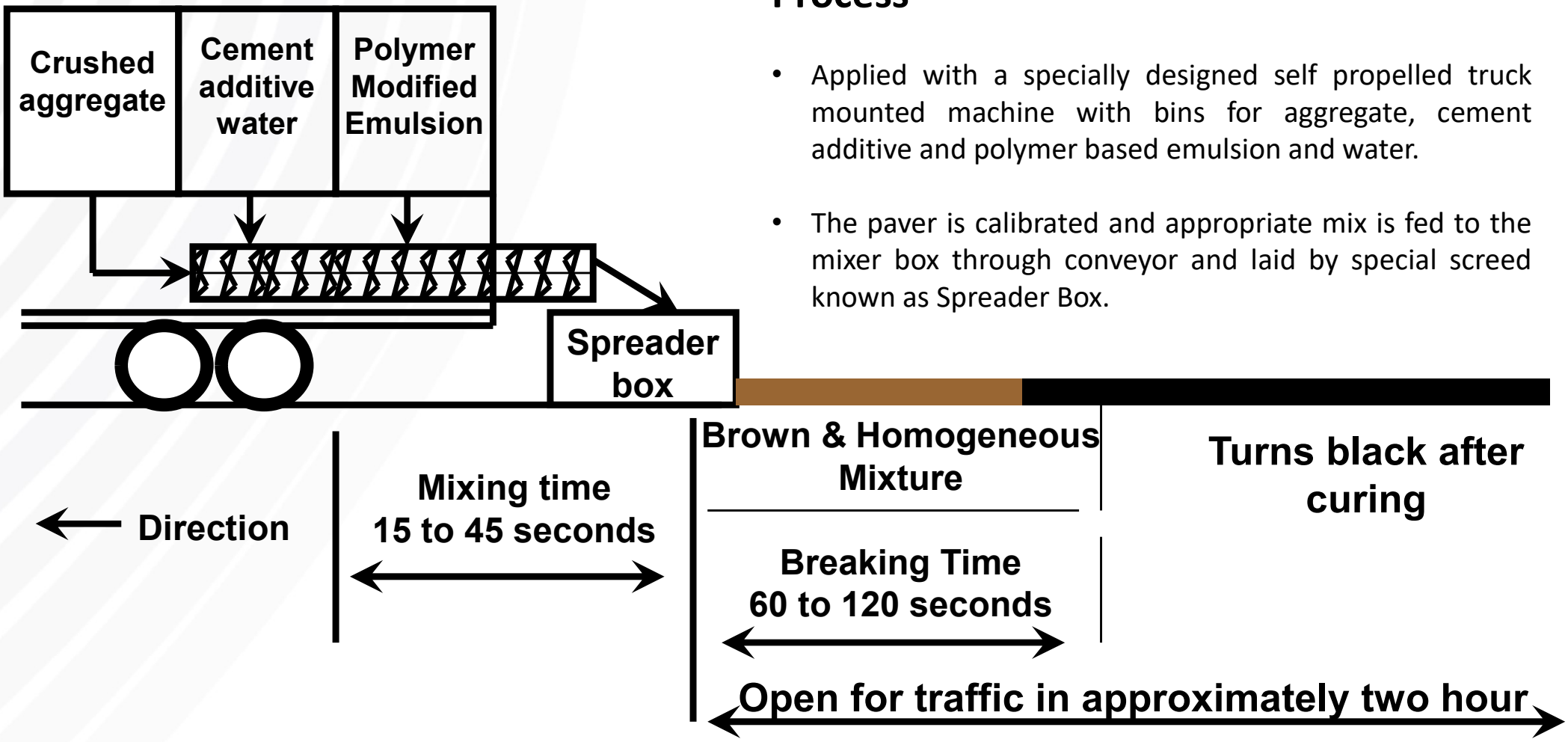
APPLICATION METHODOLOGY

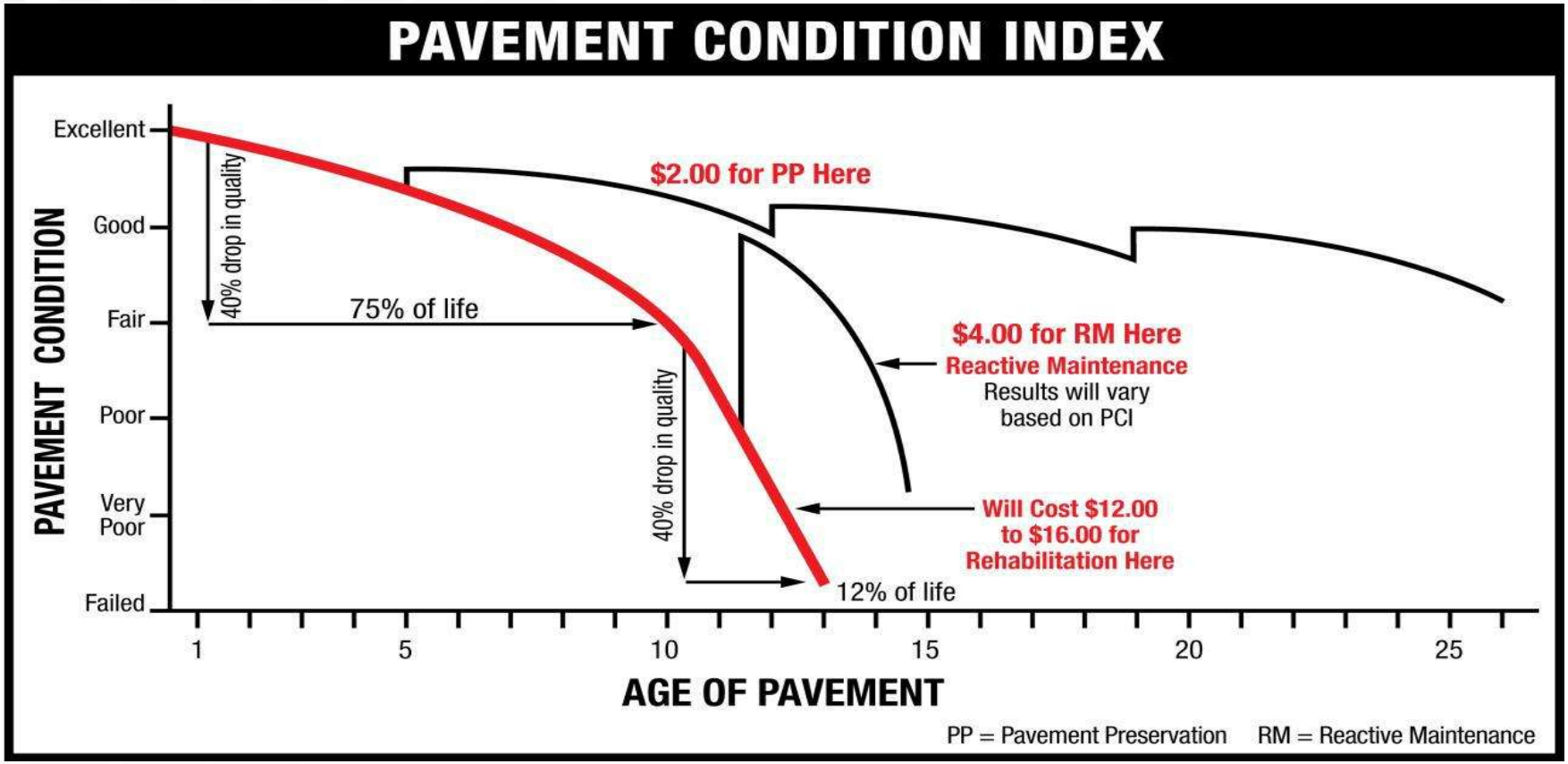
Prerequisite:

- Clean surface to ensure its free of dust and soil etc.
- Fill pot holes, cracks and Ruts.

Process

- Applied with a specially designed self propelled truck mounted machine with bins for aggregate, cement additive and polymer based emulsion and water.
- The paver is calibrated and appropriate mix is fed to the mixer box through conveyor and laid by special screed known as Spreader Box.





Proper Timing Reduces Costs

- **Preventive:** Three preservation treatments over 25 years cost $2/yd^2 per treatment for a total cost of **$6/yd^2 over the life of the road**.
- **Reactive:** Using pavement preservation after not treating for 11 years costs $4/yd^2 and **only lasts about four years between treatments** due to a deteriorated road base structure.
- **Rehabilitation:** Not treating for 12 or more years will result in a required mill and fill or full rehabilitation with a cost **upwards of $12 to $16/yd^2**.

Source: International Slurry Surfacing Assn, U.S.A

INNOVATIONS IN MICRO SURFACING

- **Highly Modified Micro surfacing** - Protects road in Demanding situations and gives High pavement life - Very Heavy Traffic, extreme temperatures
  - 4.5 %+ Polymer Loadings
  - Often with Polymer Modified Bitumen
- **Fiberized Micro surfacing**
  - 0.2% Pre-cut special grade Fiberglass is added with special equipment to the mix. The fibers form a mesh to provide longer life, resistance to raveling , increase flexibility and delay reflective cracking.

Photo of Attachment - for Adding Slurry Fil Glass Fiber

Slurry Fil fibers being added on Aggregate belt prior to discharge in Mixer box.

MICRO SURFACING WITH FIBRES

BEFORE

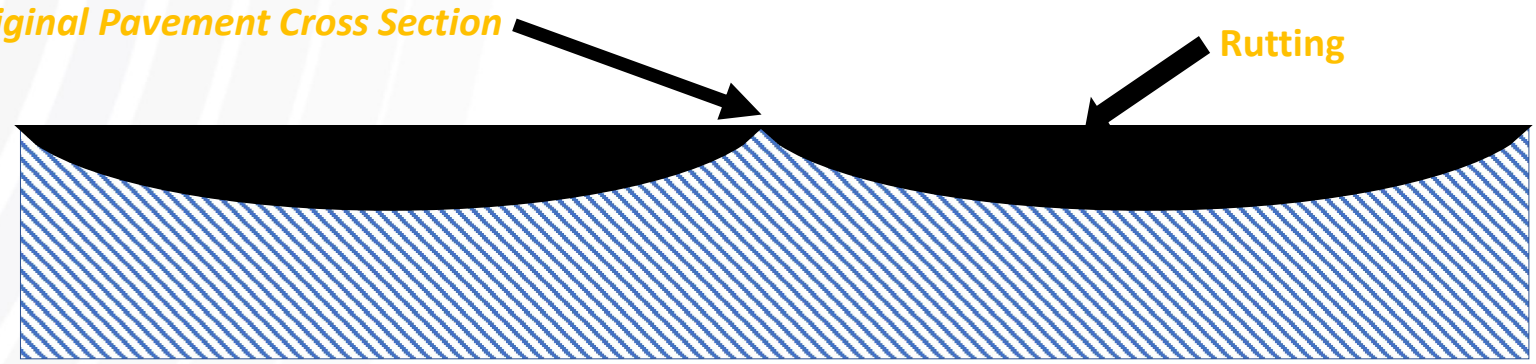
AFTER

MULTI-LAYER SYSTEMS

- Can be laid in Double or multiple lifts.
- Combination Treatments
  - ✓ Cape Seals
    - Micro surfacing provided over Chip Seal/ Surface dressing
  - ✓ Triple Seals
    - Micro surfacing used as Rut Course followed by
    - Chip Seal followed by
    - Micro surface course
  - ✓ Micro surfacing Leveling/ PCC Course w/HMA Overlay
  - ✓ Fog Seal over Micro Surfacing
  - ✓ Micro surfacing can be done on pre mix carpet without seal coat and on DBM thereby eliminating costly BC treatment
  - ✓ On Cement concrete road Micro-surfacing is done in two layers as recommended in IRC SP: 100

REPROFILING RUTTED WHEELPATHS WITH MICROSURFACING

For each inch of applied micro surface mix add 1/8” to 1/4” crown to each rut fill to compensate for return traffic compaction



RUTS 1/2 “ & OVER MUST USE THE RUT BOX

POST - APPLICATION

Project - Mahua-Jaipur Section 0f NH-21 (Earlier NH-11) from Km 120.012 to 174.741 (MS-1) in the State of Rajasthan

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Specification of Highly modified Microsurfacing Emulsion for Maintenance of Highways/Major Bridges /Flyovers/ Expressways

Properties of Emulsion			
Requirement of the test on Microsurfacing Emulsion	**Method of Test**	**Spec. as per IRC SP 100:2014**	**Our Specification**
Residue on 600 Micron IS Sieve, % Maximum	IS : 8887	0.05%	0.05%
Viscosity by SayboltFurol Viscometer, at 25°C	IS : 8887	20-100 Sec.	20-100 Sec.
Coagulation of emulsion at low temperature	IS : 8887	Nil	Nil
Storage Stability after 24 h (168h)	IS : 8887	2 (4)	2 (4)
Particle charge, + ve / -ve	IS : 8887	(+ve)	(+ve)
Tests on Residue:			
a) Residue by evaporation, % Minimum	IS : 8887	60 Min	64 Min
b) Penetration at 25°C /100 g/5 s	IS : 1203	40-100	35-60
c) Ductility at 27°C, cm Minimum	IS : 1208	50 cm	70 cm
d) Softening Point °C Minimum	IS : 1205	57 °C Min	60 °C Min
e) Elastic Recovery , % Minimum	IS : 15462	50 % Min	60 % Min
f) Solubility in Trichloroethylene, % Minimum	IS : 1216	97%	97%

Note : The Properties can be amended to suit the necessary application

Specification of Highly modified Microsurfacing Emulsion for Maintenance of Highways/Major Bridges /Flyovers/ Expressways

Properties of Aggregates			
Requirement of the test on Microsurfacing Emulsion	**Method of Test**	**Spec. as per IRC SP 100:2014**	**Our Specification**
Sand Equivalent Value	IS:2720 (Part 37)	Min 50 %	Min 60%
Water absorption*	1S:2386 (Part 3)	Max 2 %	Max 2 %
Soundness with-	IS:2386 (Part 5)		
Sodium sulphate		Max 12 %	Max 12 %
Magnesium sulphate		Max 18 %	Max 18 %

Note : The Properties can be amended to suit the necessary application

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Specification of Highly modified Microsurfacing Emulsion for Maintenance of Highways/Major Bridges /Flyovers/ Expressways

Mix Design Criteria for Micro Surfacing Mix			
Requirement of the test on Microsurfacing Emulsion	**Method of Test**	**Spec. as per IRC SP 100:2014**	**Our Specification**
Consistency, Maximum	Appendix – 3 of IRC SP 81:2008	3 cm	3 cm
Wet Cohesion, within 30 Minutes, Minimum	Appendix – 4 of IRC SP 81:2008	Min 12 kg.cm	Min 15 kg.cm
Wet Cohesion, within 60 Minutes, Minimum	Appendix – 4 of IRC SP 81:2008	Min 20 kg.cm	Min 22 kg.cm
Wet Stripping value, %maximum	Appendix – 5 of IRC SP 81:2008	90%	95%
Wet Track abrasion Loss (One-hour soak), Maximum	Appendix – 6 of IRC SP 81:2008	538 gm/m2	300 gm/m2
Wet Track abrasion Loss (Six-Days soak), Maximum	Appendix – 6 of IRC SP 81:2008	807 gm /m2	450 gm/m2
Loaded Wheel test	TB 147- ISSA	Not Mentioned in IRC	Loaded wheel test is mandatory for checking rutting performance of micro-surfacing mix (lateral displacement 5%maximum, vertical displacement 10% maximum)
Loaded Wheel test (Sand Adhesion)	TB A-143 ISSA	Not Mentioned in IRC	Excess Asphalt Loaded Wheel test as per ISSA Max. Value is 50 g/ft2 (538 g/m2) Maximum.

Note : The Properties can be amended to suit the necessary application

Specification of Highly modified Microsurfacing Emulsion for Maintenance of Highways/Major Bridges /Flyovers/ Expressways

Other Requirements			
Requirement of the test on Microsurfacing Emulsion	**Method of Test**	**Spec. as per IRC SP 100:2014**	**Our Specification**
Cement Dosage	As per IRC SP 81 : 2008	0.5 to 2% by weight of dry aggregate	0.5 to 2% by weight of dry aggregate
Methylene blue test	As per ISSA TB 145	<15	< 20
Additives	As per IRC SP 81 : 2008	0 to 2% by weight of dry aggregate	0 to 2% by weight of dry aggregate, or as per Mix Design
Residual Binder in Mix	As per IRC SP 81 : 2008	5.5 to 10.5 % by weight of dry aggregate	Subject to Mix Design
Mix Time	As per IRC SP 81 : 2008	Min 120 Sec	Min 120 Sec

Note : The Properties can be amended to suit the necessary application

Photo Gallery (Before Work)

MMRDA – Eastern Expressway Project

Photo Gallery (After Work)

MMRDA – Eastern Expressway Project

Photo Gallery (Construction Activity)

MMRDA – Eastern Expressway Project

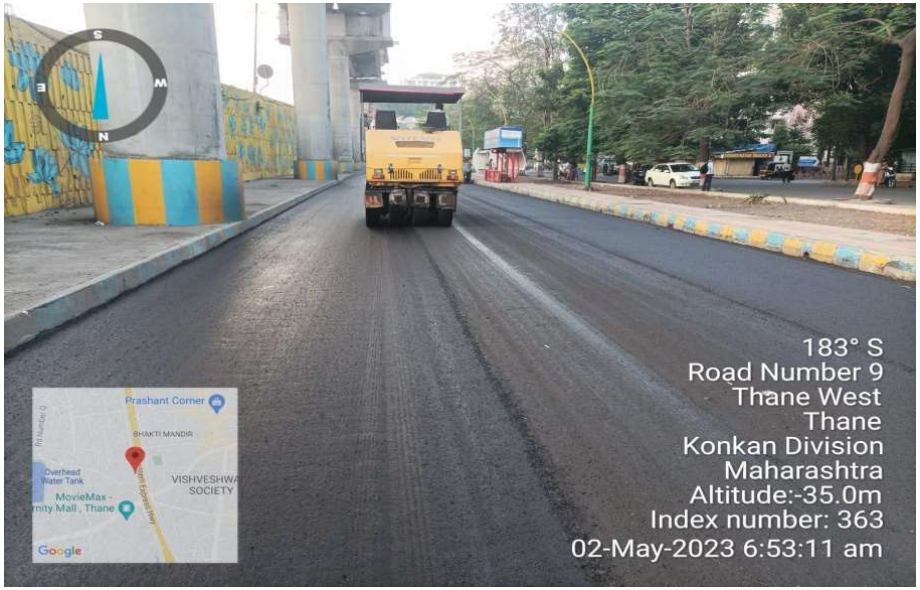
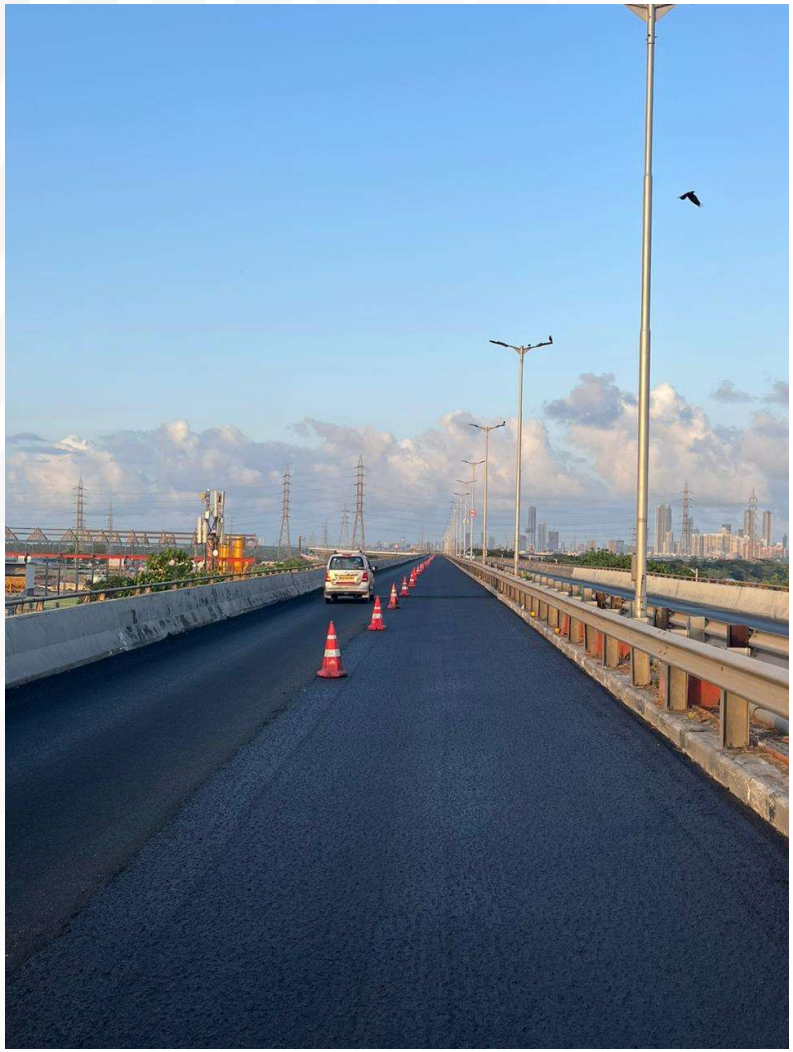


Photo Gallery (Work in Progress)

MCGM – Eastern Freeway Project



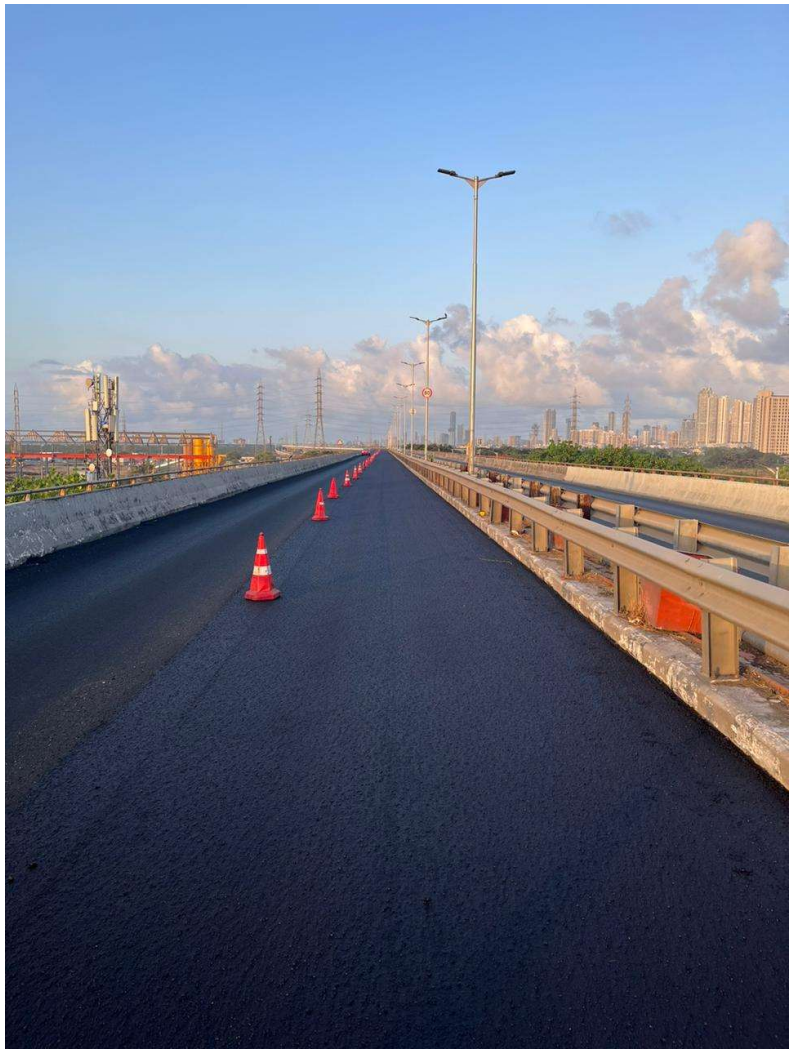


Photo Gallery

Right Materials , Machinery and Manpower are crucial factor in determining the success of Microsurfacing

Photo Gallery

Markolines

Micro surfacing is a versatile product that has many uses beyond surface sealing of roadways.

First project in India, where highly modified Micro surfacing with fibres was executed on an active runway at Ahmedabad Airport Sep 2018 of AAI.

Markolines Pavement Technologies Limited
A Wing, 6th Floor, Shree Nand Dham,
Sector 11, CBD Belapur, Navi Mumbai - 400 614.
Maharashtra, INDIA
EMAIL: info@markolines.com
Phone: +91 22 6266 1111

Contact Person Details

Mr. S.P. Nagarkar
Director -Technical
sp.nagarkar@markolines.com
+91-7710002487

Mr. Chetan Soni
Sr. Manager – Microsurfacing
chetan.soni@markolines.com
+91 85598 83550