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Introduction to Microsurfacing
Cost effective solutions for Maintenance of Highways/Major Bridges /Flyovers/ Runways

MICROSURFACING IN-DEPTH

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PROCESS

It is an eco-friendly laboratory designed mixture of Polymer modified emulsion, 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

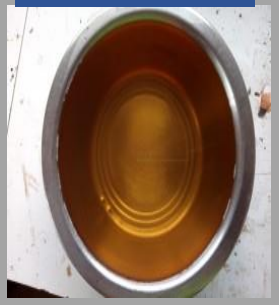
AGGREGATE

STONE DUST

CEMENT

EMULSION

ADDITIVE



WATER

HISTORY

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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.

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
- Provides new wearing surface.
- No compaction required
- Seals the surface and prevents ingress of water
- Does not increase pavement height significantly (Road furniture, drainage is not disturbed)
- Saving of Natural resources

MICROSURFACING MIX DESIGN

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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

APPLICATION METHODOLOGY

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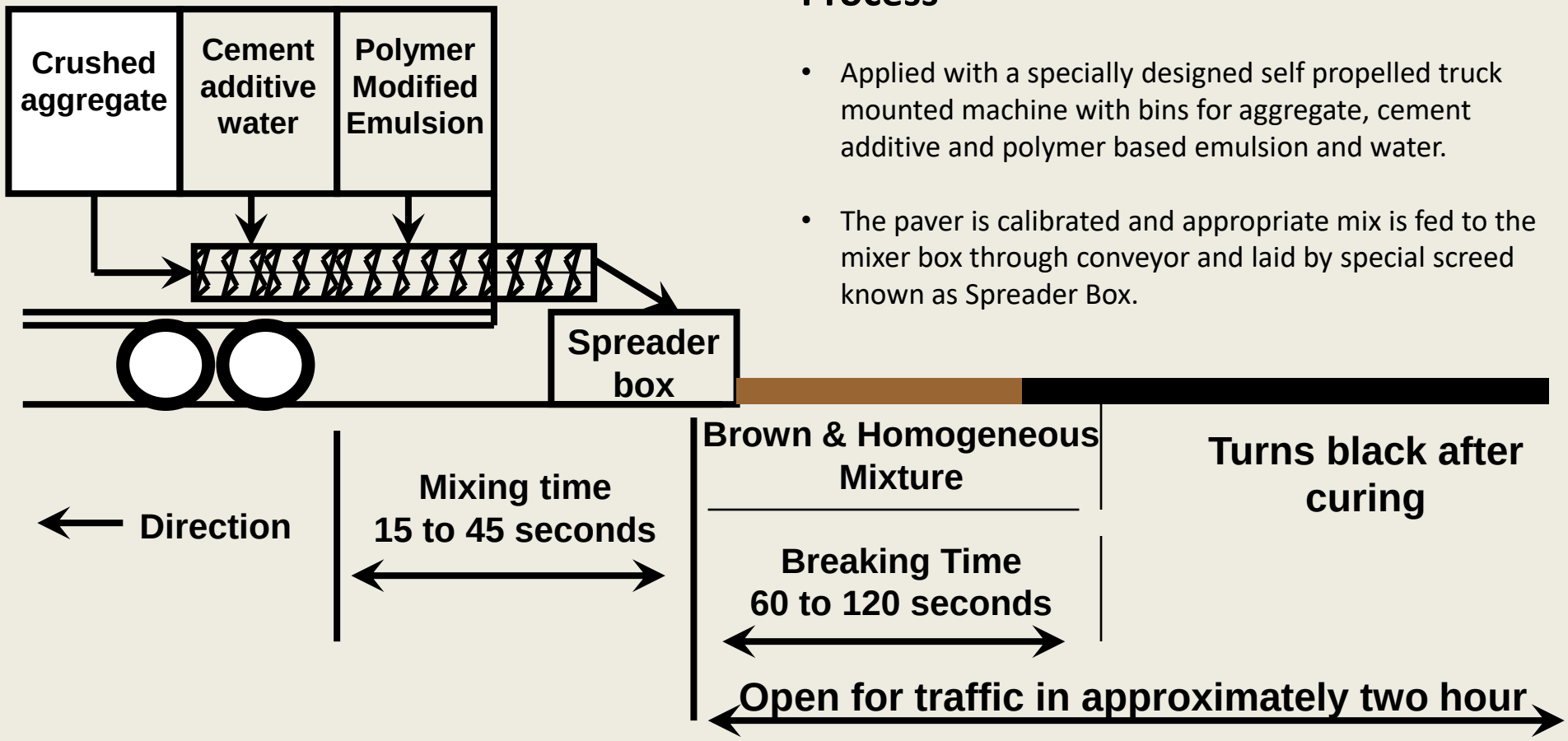
Prerequisite:

- 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.



INNOVATIONS IN MICRO SURFACING

- **Highly Modified Micro surfacing** - Protects road in Demanding situations and gives High pavement life - Very Heavy Traffic, extreme temperatures
  - 6 %+ Polymer Loadings
  - Often with Polymer Modified Bitumen
- **Fiberized Micro surfacing**
  - 2 % Fiberglass, Polyester or Polypropylene fiber can be added. The fibers form a mesh to provide longer life, resistance to raveling , increase flexibility and delay reflective cracking.
  - Fibers can also be combined with high polymer loadings which provides even greater resistance to cracking
- **Gap graded Micro surfacing**

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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%
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	62 °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

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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

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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	at 2% by weight of aggregate or Subject to Mix Design
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	at 1% by weight of dry aggregate or Subject to Mix Design and ambient temp.
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

MICRO SURFACING WITH FIBRES

BEFORE

AFTER

Photo of Attachment - for Adding Slurry Fil Glass Fiber

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

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 on pre mix carpet without seal coat and also on DBM / BM
  - ✓ Two layers of micro surfacing recommended on Cement concrete pavement as per IRC SP: 100

REPROFILING RUTTED WHEELPATHS WITH MICROSURFACING

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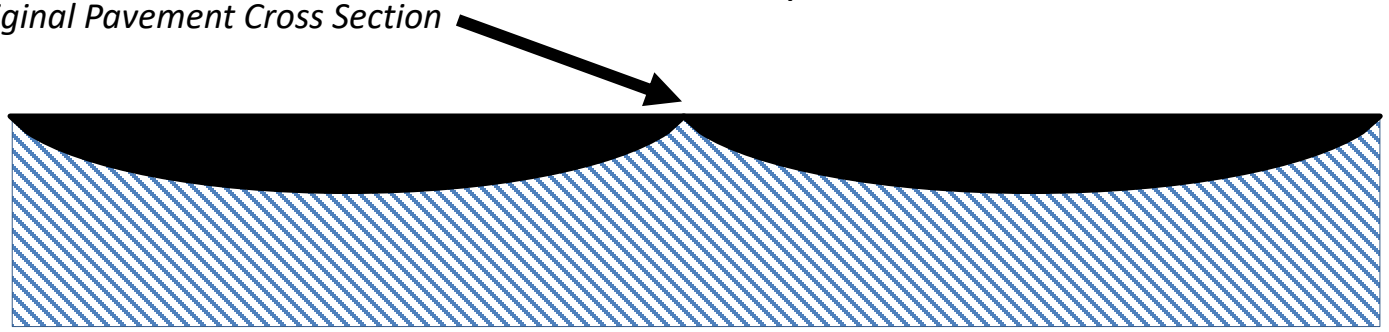
For each inch of applied microsurface mix add 1/8” to 1/4” crown to each rutfill to compensate for return traffic compaction

Original Pavement Cross Section



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

Rut Box

POST - APPLICATION

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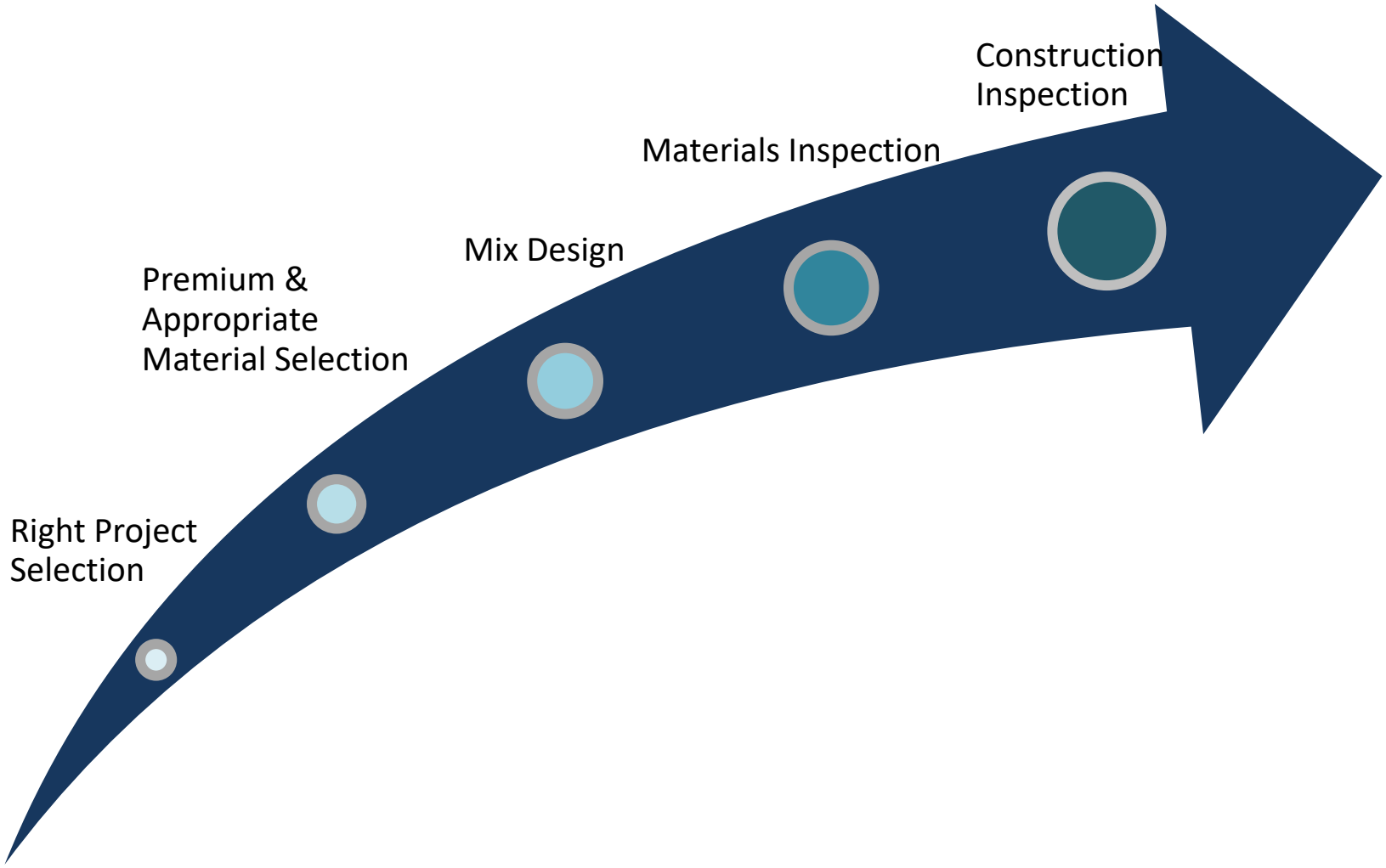
Project - Mahua-Jaipur Section 0f NH-21 (Earlier NH-11) from Km 120.012 to 174.741 (MS-1) in the State of Rajasthan

WHY US


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

About Us

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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 three 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	•Routine Maintenance	•Microsurfacing
•Route Patrolling	•Preventive Maintenance	•Cold-In-Place Recycling – CIPR, Soil Stabilisation
•Incident Mgmt	•Major Maintenance & Repairs	

OUR EXPERTISE IN MICROSURFACING

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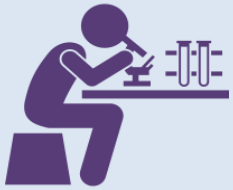
Executed more than 3.5+ million SQ Ms of Microsurfacing



Technology Centre for pavement preservation solutions

Ownership of Microsurfacing pavers

Tie-up with international organisations 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..

OUR PROJECTS

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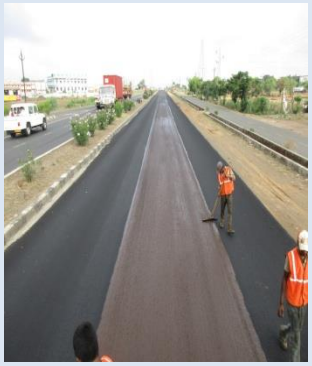
Trichy - Dindigul NH 45



Mumbai – Nasik(NH3 Old)

Nasik (NH 3)

Pune – Nasik (NH - 50)

Ahmednagar – Pathardi (NH - 222)

JMTPL (NH-21)

NMMC – Palm Beach Rd

Lebad – Jaora (SH 31)

Workmanship is a crucial factor in determining the success of Microsurfacing

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.

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OUR CLIENTELE

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