

Revolutionizing Road Infra with Modern Equipment, Technologies, Sustainable Materials and Policy Guidelines

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A New Technology First Time Used in India for Improving the Riding Quality of a Newly Constructed Concrete Expressway: A Case Study

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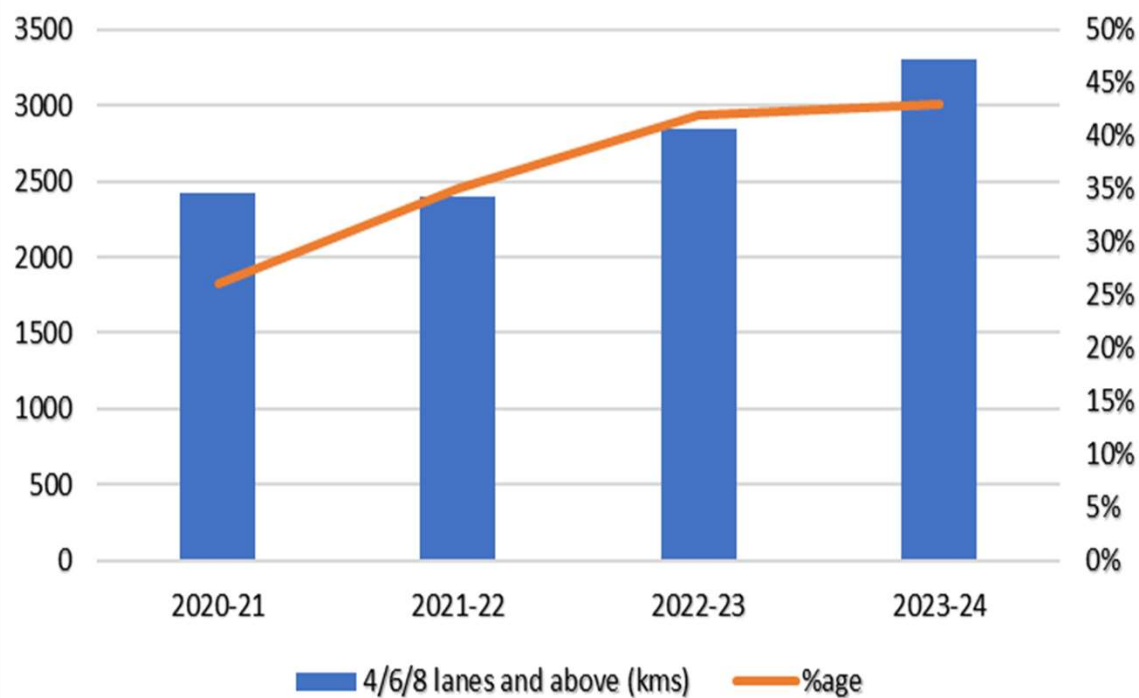


**International Road Federation
India Chapter**

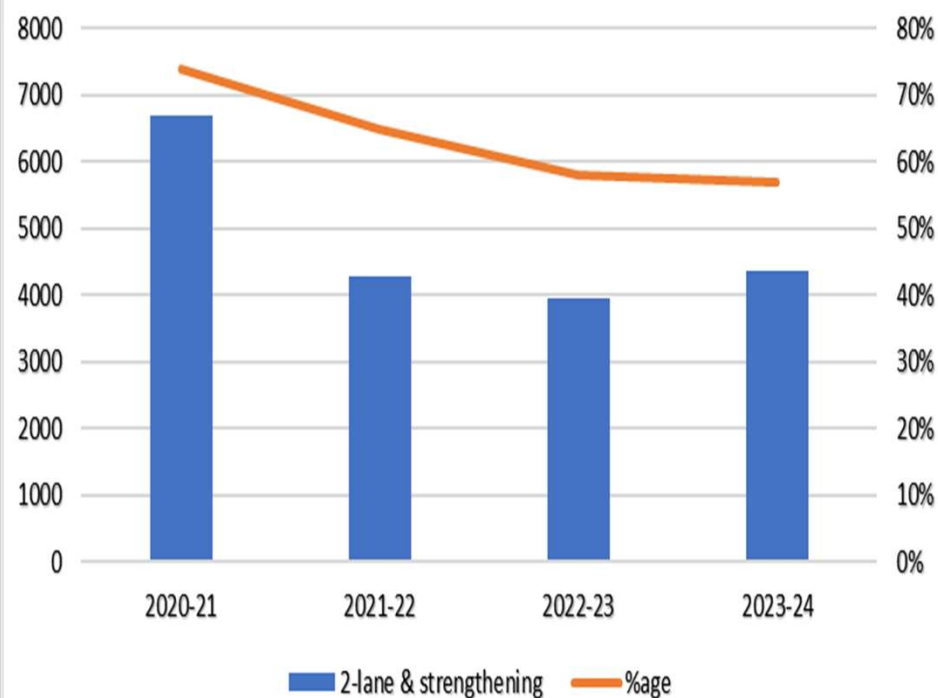
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A recent trend of the construction of 4-lane and more Highways

Construction of multi-lane NHs



Construction of 2-lane & strengthening



Adverse impacts of a poor riding quality

- **Reduced public satisfaction (Justification for toll collection)**
- **Increased accident risk**
- **Higher fuel consumption in heavy vehicles leading to increased air pollution**
- **Maintenance cost of highway as well as vehicles**

Condition of road surface					
Good		Fair		Poor	
RI	IRI	RI	IRI	RI	IRI
<2000	<2.81	2000-2400	2.81-3.30	> 2400	> 3.30

A Technology (Macro Milling) First Time Used in India for Improving the Riding Quality of a Concrete Expressway



Typical views after milling of the concrete pavement surface



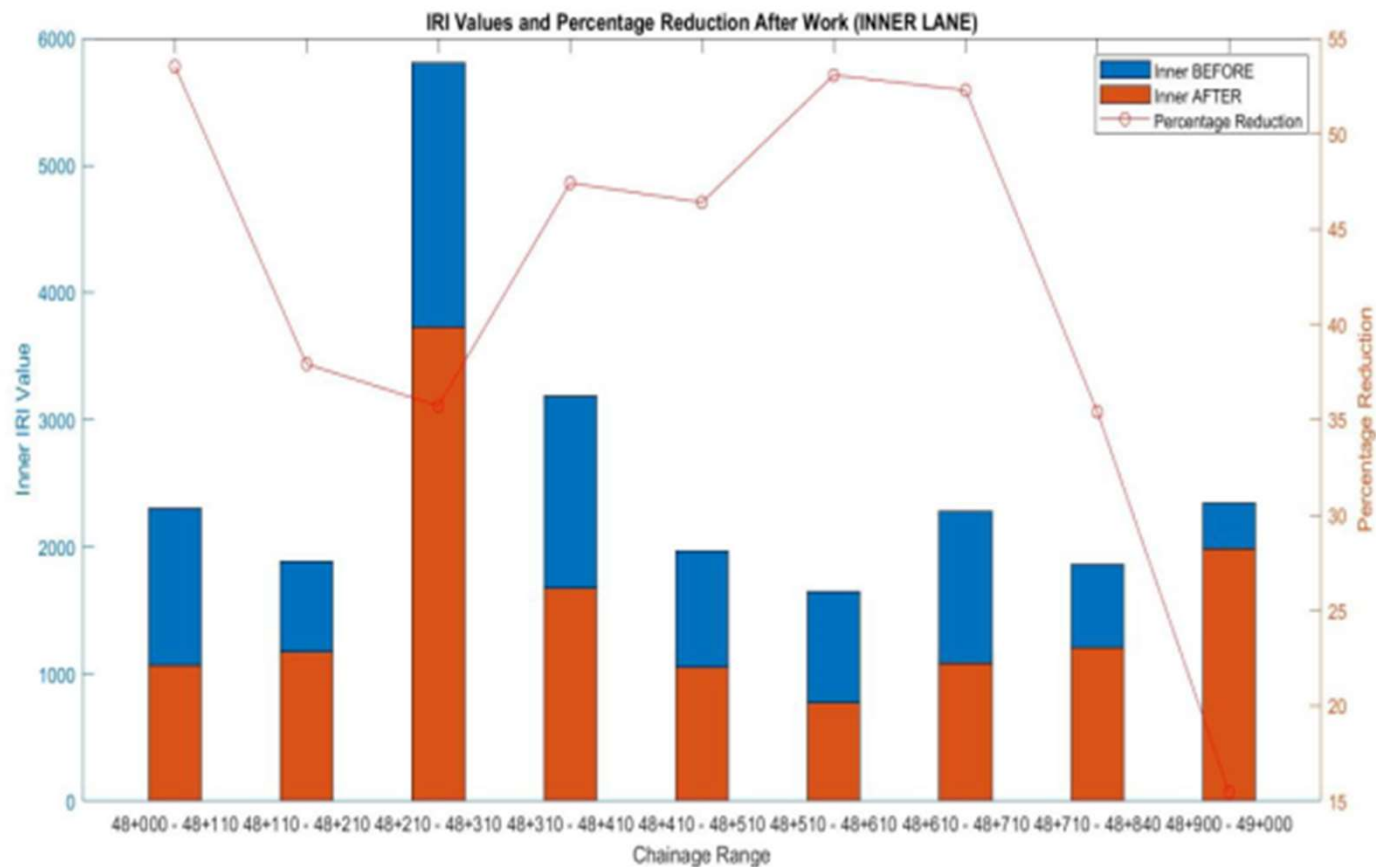
Macro-milling of the concrete pavement surface



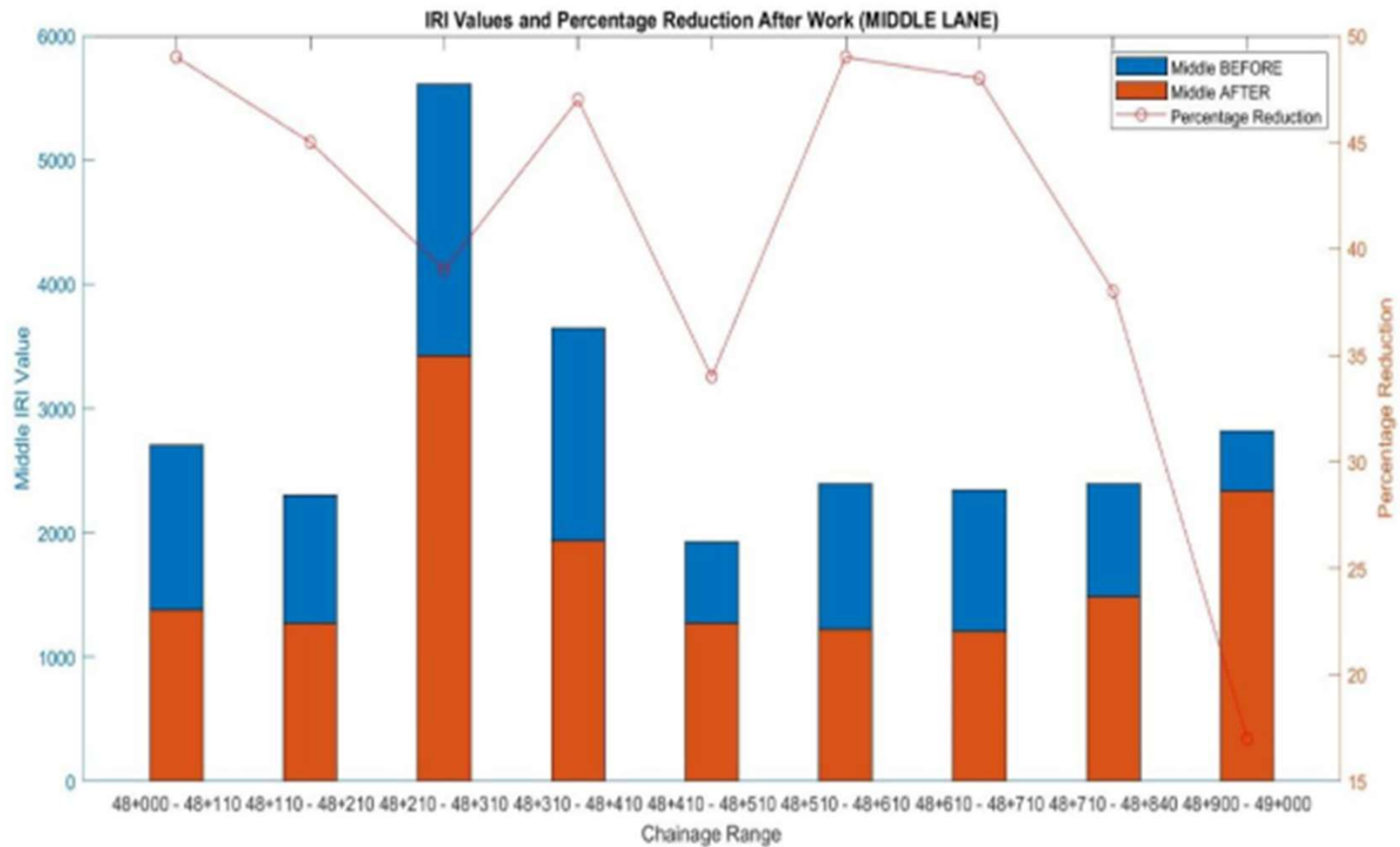
Measurement of texture depth after milling of the pavement



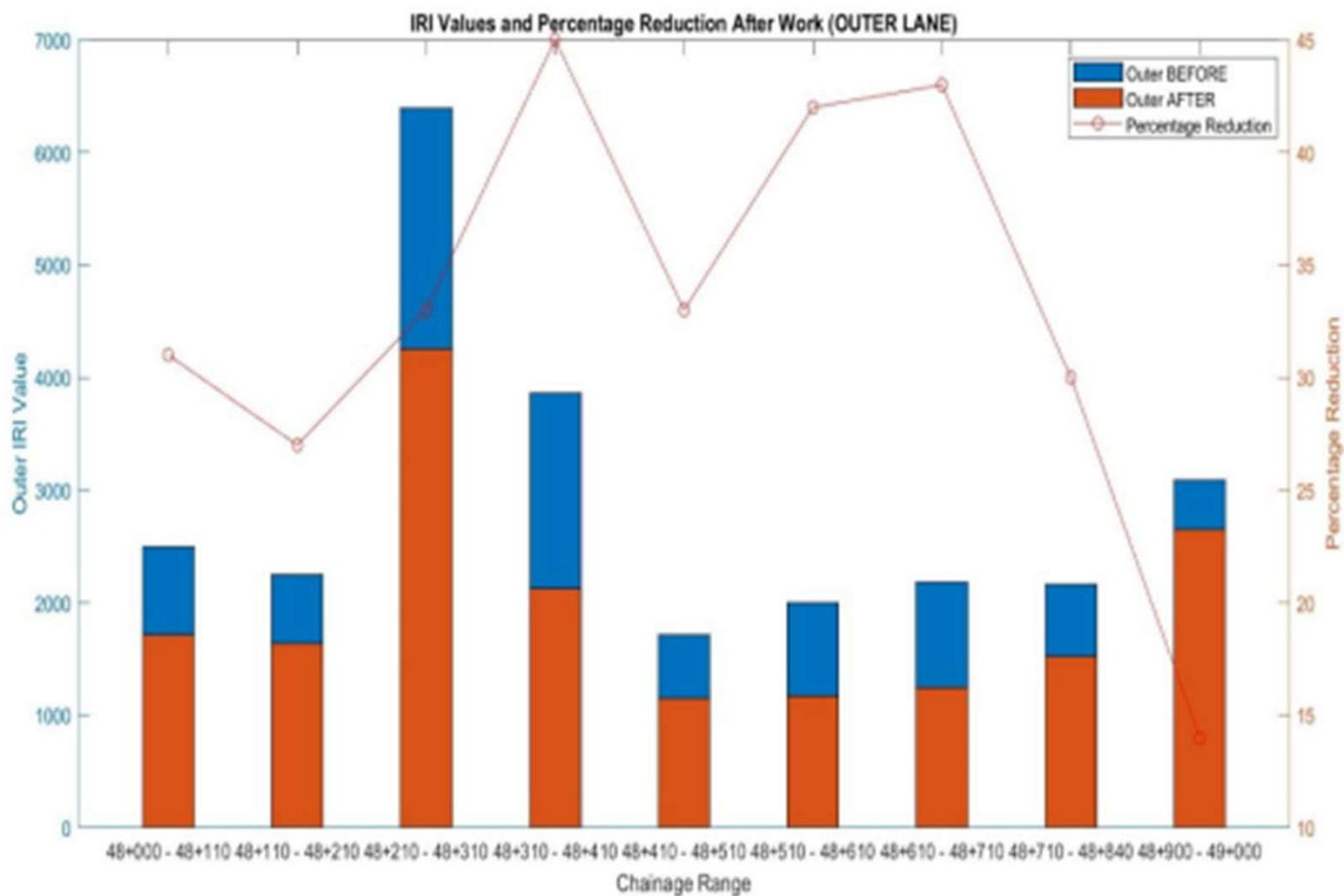
IRI values of the inner lane (before and after work) and percentage reduction



IRI values of the middle lane (before and after work) and percentage reduction



IRI values of the outer lane (before and after work) and percentage reduction



Lane wise Average MTD, after milling on 5th May 2023 and 7th August 2023 and Codal provision for new concrete road

Lane	Avg. MTD and range as on 5/05/2023, mm	Avg. MTD and range as on 7/8/2023, mm	Avg. MTD required at new concrete road, IRC:15-2017, MoRTH-2013
Outer	0.58 (0.54-0.65)	0.41 (0.35-0.48)	0.65-1.25 mm after six weeks of construction & before traffic is allowed*
Middle	0.53 (0.49-0.60)	0.36 (0.28-0.38)	
Inner	0.54 (0.44-0.63)	0.40 (0.30-0.43)	
Overall average	0.55	0.39	
			ASTM E 965, 1.5 mm for heavily trafficked areas

Conclusions

- * *The selected test section of 900 m was free from any structure including a cross-drainage work.*
- * *The methodology adopted for improving the pavement roughness effectively reduces the IRI at different levels varying from lane to lane and stretch to stretch. Out of about 900 m test section, 700 m has shown improved.*
- * *Despite the use of surface milling, some stretches of the test section (Chainages km 48+210 – km 48+310 (all three lanes) and km 48+900 – km 49+000 (middle & outer lane) remained in the category of unacceptable based on their IRI values for concrete pavement indicating the need for further interventions or adoption of suitable alternative strategies.*



Conclusions (cont'd)

- * The average mean texture depth of the milled pavement slab measured on 5/5/2023 and 7/8/2023 varies between 0.53 and 0.58 mm and 0.36 and 0.41, which fails to meet the minimum requirement as given in IRC codes & the MoRTH Specifications even for a new concrete road.
- * A faster deterioration of the average mean texture depth (reduced from the overall average texture depth from 0.58 mm to 0.39 mm, which is 29% over three months) of the milled surface indicates the frequent milling requirement.
- * The methodology adopted for improving the riding quality of the road limits its adequacy for the safety of the users due to a faster deterioration of the milled texture depth on this kind of expressway.

Message to policy makers

- * **Encourage Strict Preventative Measures (for new or under construction highways):**
 - **Improved Quality Construction:** Utilize precise levelling, proper joint finishing, and optimized curing procedures.
- * **Material Selection:** Choose high-quality concrete mix with optimized aggregate properties to minimize shrinkage and cracking.
- * **Joint Design and Installation:** Implement dowelled joints or tied concrete pavements.



Thank You

