

MICRO-SURFACING ON FRENCH HIGHWAYS : RECENT SUCCESSFUL EXPERIENCES

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Introduction

- **The maintenance strategy of highway wearing course is an important issue.**
- **Hot and warm mix asphalt materials are able to cover all wearing course functions :**
 - **Skid resistance**
 - **Waterproofing**
 - **Drainage**
 - **Evenness**
 - **Rolling noise**
- **But micro-surfacing has also adequate characteristics.**
- **So this process can be used instead of asphalt mixes.**

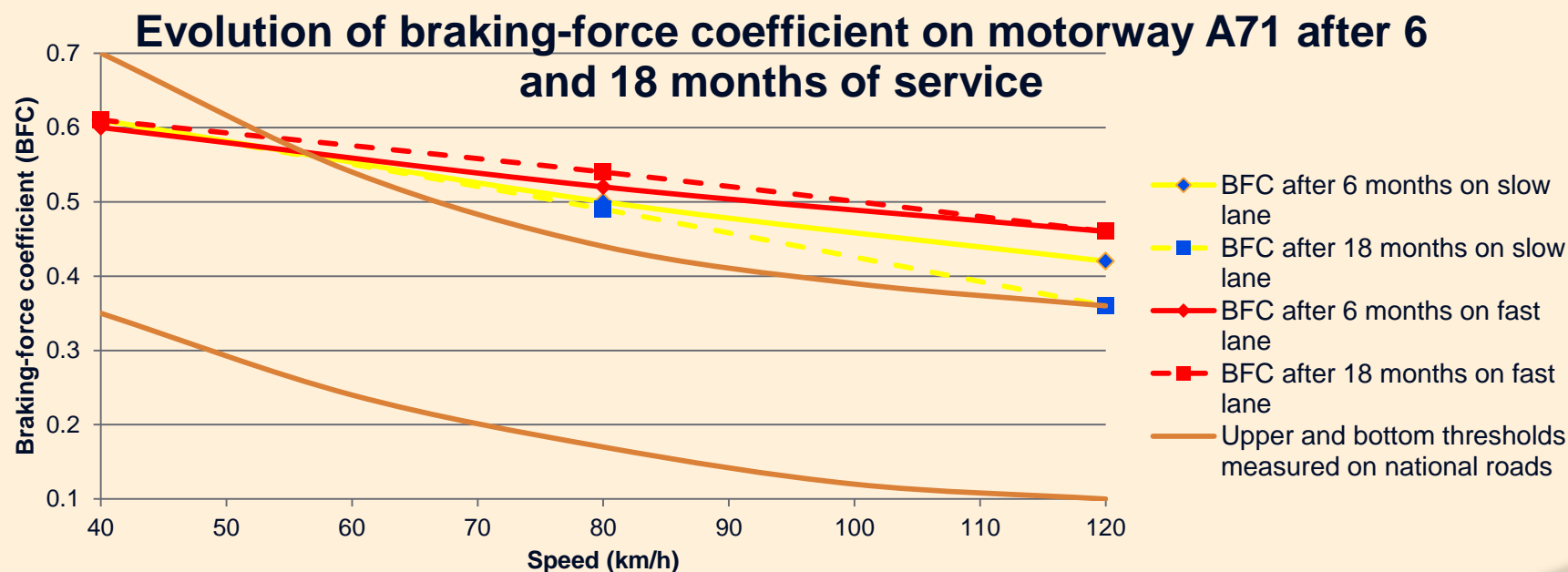
Gripfibre ®

- **What is Gripfibre ® ?**
- **A microsurfacing with gap-graded or continuous grading curve**
- **Composed of bitumen emulsion often modified by polymers, and of organic fibres**



Gripfibre ® : First experimentations on highways

- Summer 1998 : 2 kms of the A71 highway were realized for maintenance works with Gripfibre® 0/10
- Measurements of braking force coefficient after 6 and 18 months



A 87 construction site

- **Characteristics of construction site :**
 - Located between Cholet North and Cholet South exits on the A 87 highway.
 - From 10th to 20th September 2007.
 - Realized by a special team of Eurovia South West.
 - Heavy traffic : T1 (500 trucks per day).
 - Support layer : semi-coarse asphaltic concrete applied in 2000.
- **Characteristics of product :**
 - **Using of dual layer applications 0/4 – 0:10 continuous grading :**
 - First layer : 0/4 grading with a bitumen emulsion modified by polymers.
 - Second layer : 0/10 grading with fibres to facilitate the laying of the product and these fibres avoid segregation. Fibres allow Gripfibre® to have an improved ageing resistance.

A 87 construction site : Mix design

Formula	Microsurfacing 0/4 Pont Charron/Meilleraie		Microsurfacing 0/10 c Pont Charron	
	Composition	0/4 Pont Charron	60%	0/2 Pont Charron
2/4 La Meilleraie		40%	2/6 Pont Charron	40%
			6/10 Pont de Charron	20%
Hydrated lime (ppc)		0.5	Hydrated lime (ppc)	0.5
Fibers (ppc)		-	Fibers (ppc)	0.07
Added water (ppc)		11	Added water (ppc)	10
PmB Emulsion (ppc)		11.8	PmB Emulsion (ppc)	10.8
Residual binder (ppc)		7.1	Residual binder (ppc)	6.48
Maximum density (t/m3)		2.638	Maximum density (t/m3)	2.683
Binder modulus	4.54	Binder modulus	4.24	

A 87 construction site :

Tests on dual-layer micro-surfacing

	Standard	Unit	Specifications	Micro-surfacing 0/4	Micro-surfacing 0/10 c
Working time :	MEI				
• Workability time		s	≥ 90	90	110
• Breaking time		min	≤ 20	4	4
Benedict cohesion :	NF EN 12274-4				
• Cohesion at 30 min		kg.cm	≥ 20	23	23
• Cohesion at 60 min		kg.cm	≥ 23	24	24
Abrasion WTAT :	MEI				
• Weight loss (T = 18°C, HR=55%)		%	≤ 5	-	0
• Weight loss (T = 18°C, HR=100%)		%	≤ 25	-	2

A 87 construction site

- **Laying :**
 - **Laying controls have been carried out during the construction site.**
 - **During 6 days :**
 - **Road surface coated : 117 300 m²**
 **234 600 m² of microsurfacing**
 - **Laying speed : between 1.5 and 2.5 km/h for a width of 3.8m**
 **Process with a high rate, which is very appreciated on motorway construction site.**

A 87 construction site : Monitoring of macrotexture after 1 year and 4 years

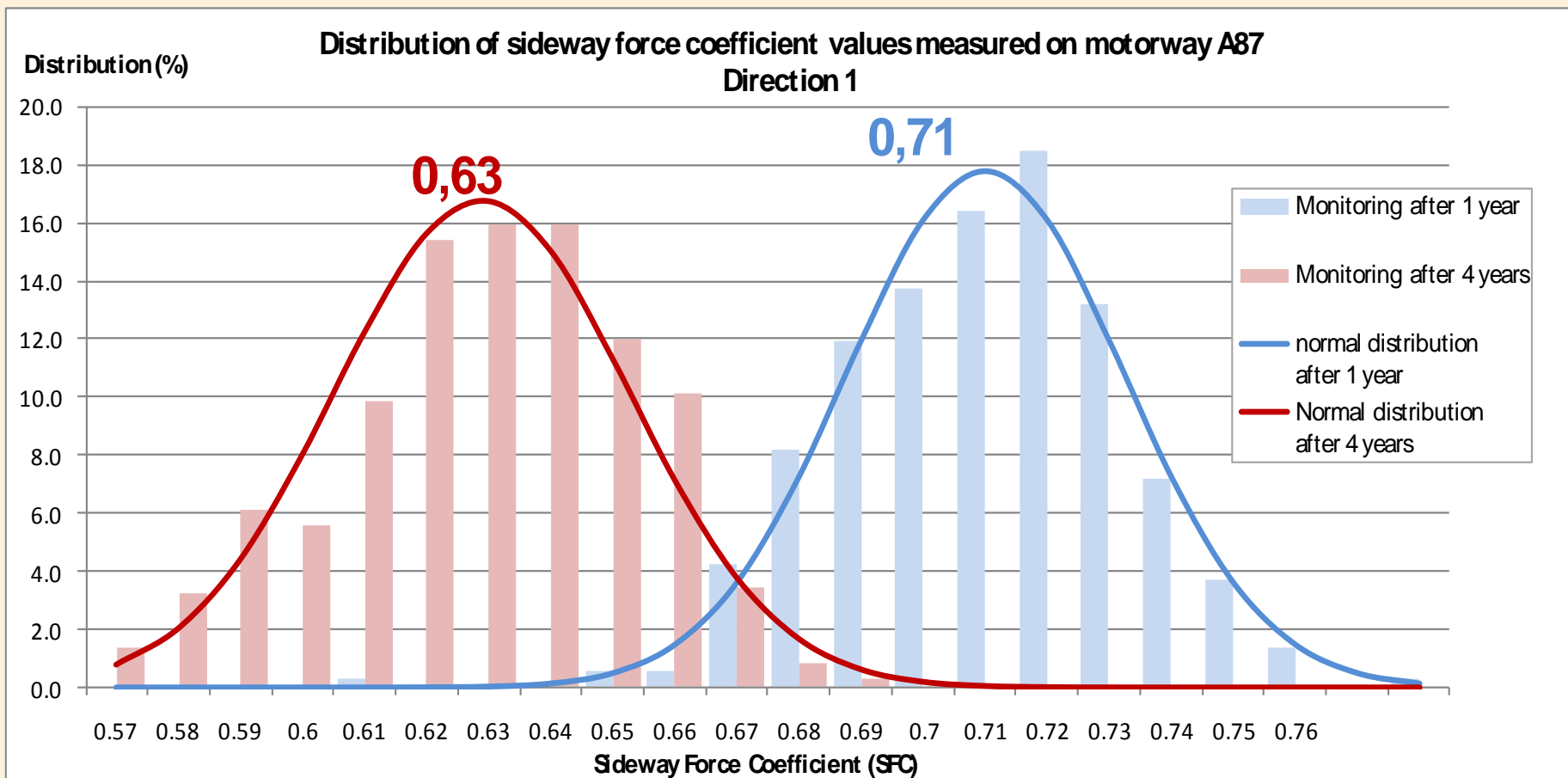
		Average texture depth	
		Sand patch values	Standard deviation
October 2008	Direction 1 : From Paris to La Roche-sur-Yon	1.15 mm	0,05 mm
	Direction 2 : From La Roche-sur-Yon to Paris	1.1 mm	0.08 mm

		Average texture depth	
		Average	Standard deviation
June 2008	Direction 1 : From Paris to La Roche-sur-Yon	1.3 mm	0.11 mm
	Direction 2 : From La Roche-sur-Yon to Paris	1.2 mm	0.13 mm
June 2011	Direction 1 : From Paris to La Roche-sur-Yon	1.0 mm	0.10 mm
	Direction 2 : From La Roche-sur-Yon to Paris	1.0 mm	0.15 mm

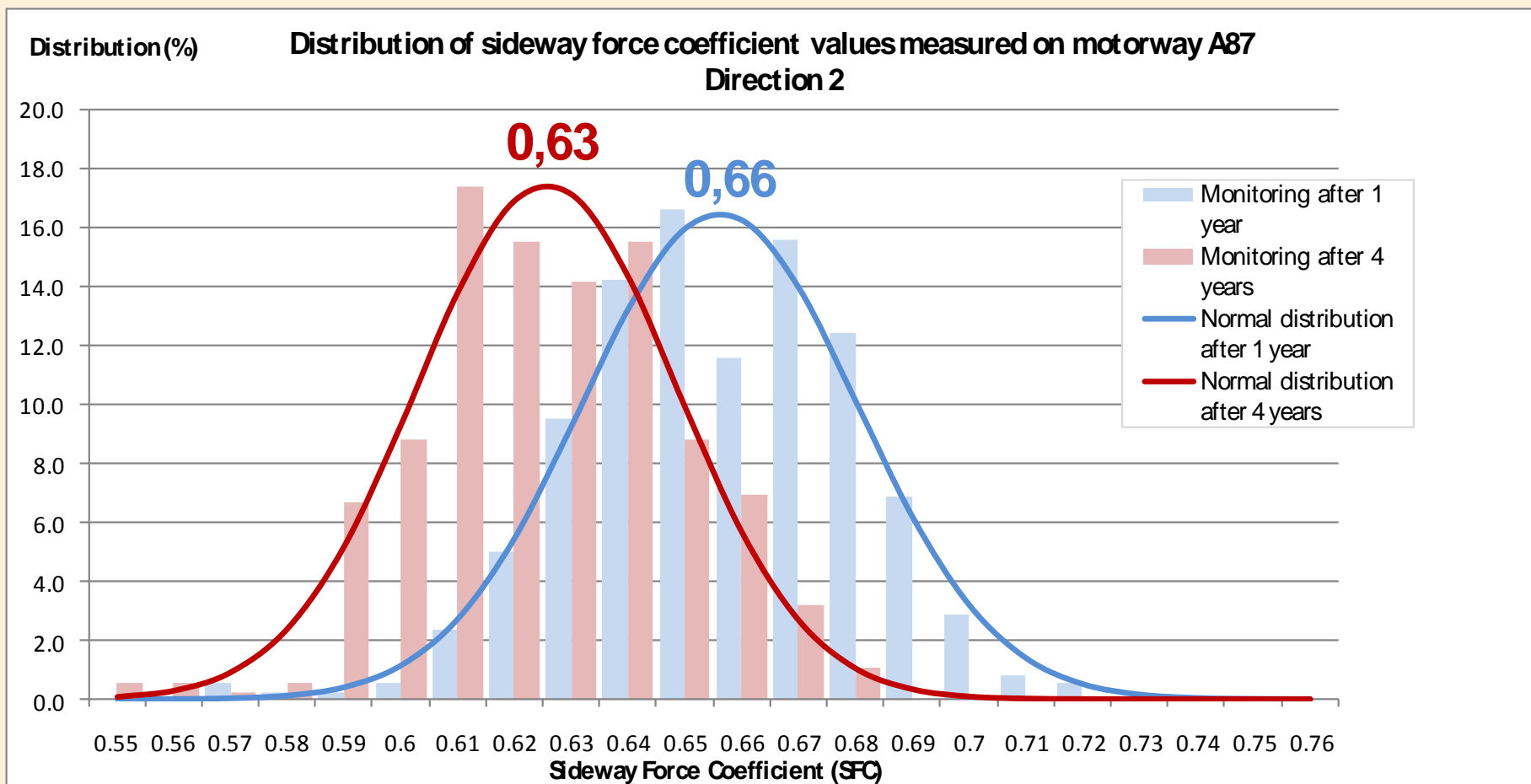
A 87 construction site : Monitoring of sideways force after one year and four years

		Sideways force coefficient	
		Average	Standard deviation
June 2008	Direction 1 : From Paris to La Roche-sur-Yon	0.71	0.02
	Direction 2 : From La Roche-sur-Yon to Paris	0.66	0.02
June 2011	Direction 1 : From Paris to La Roche-sur-Yon	0.63	0.02
	Direction 2 : From La Roche-sur-Yon to Paris	0.63	0.02


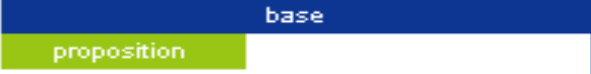








A 87 construction site : Evolution of skid resistance on highway A87 – Direction 1



A 87 construction site : Evolution of skid resistance on highway A87 – Direction 2



Environmental impact of micro-surfacing

Environmental indicator	Difference		100%
	Absolute value	%	
Depletion of resources (ADP) (kg eq Sb)	-4,579	-55%	
Aggregate consumption (Tonnes)	-3,330	-59%	
Energy resources consumption (MJ)	-2,889,798	-62%	
Direct fuel oil consumption (Liters)	-61,909	-80%	
Overall transport (Tonnes km)	-479,754	-62%	
Emission of GHG climate change (kg eq CO2)	-182,444	-63%	
Atmospheric acidification (kg SO2 equ)	-1,932	-69%	
Air pollution (m3)	-21,720,265	-70%	
Water pollution (m3)	-109,549	-61%	
Photochemical ozone creation ozone (kg eq Eth)	-205	-67%	

Conclusions

- **Recently, Gripfibre® product was applied on sections of highways with high traffic level.**
- **This technique shows an advantageous environmental impact as well as very a good and durable skid resistance.**
- **The performance of this product is still monitored.**

Thank you for attention



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