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But what about Skid Resistance

Retexturing- the sustainable approach

Tim Naidu
Briser Road Safety

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Outline

The Problem: Litigation
Provision of Skid Resistance
Causes of Low Skid Resistance
Measurement

Maintenance Options
Retexturing Methods
Practical Applications
Considerations

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Reliable Road Surface Requirements

Ride quality
Waterproof
Contamination resistant
Economic Maintenance
Strength & Durability

Noise reduction
Spray reduction

Water dispersion
Grip

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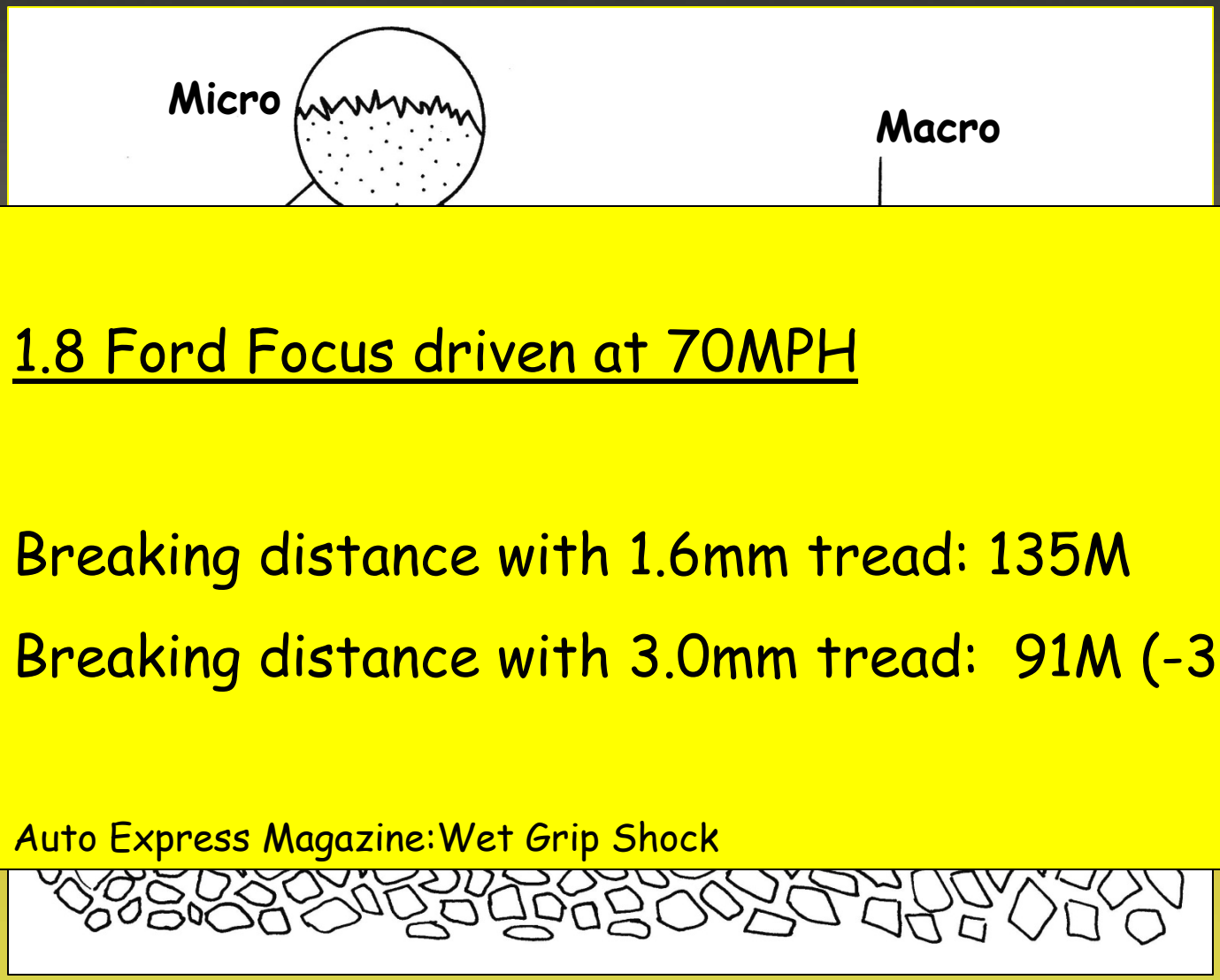
Macro and Microtexture



Positive Texture

1.8 Ford Focus driven at 70MPH

Breaking distance with 1.6mm tread: 135M

Breaking distance with 3.0mm tread: 91M (-30%)

Auto Express Magazine:Wet Grip Shock

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Seasonal Variations

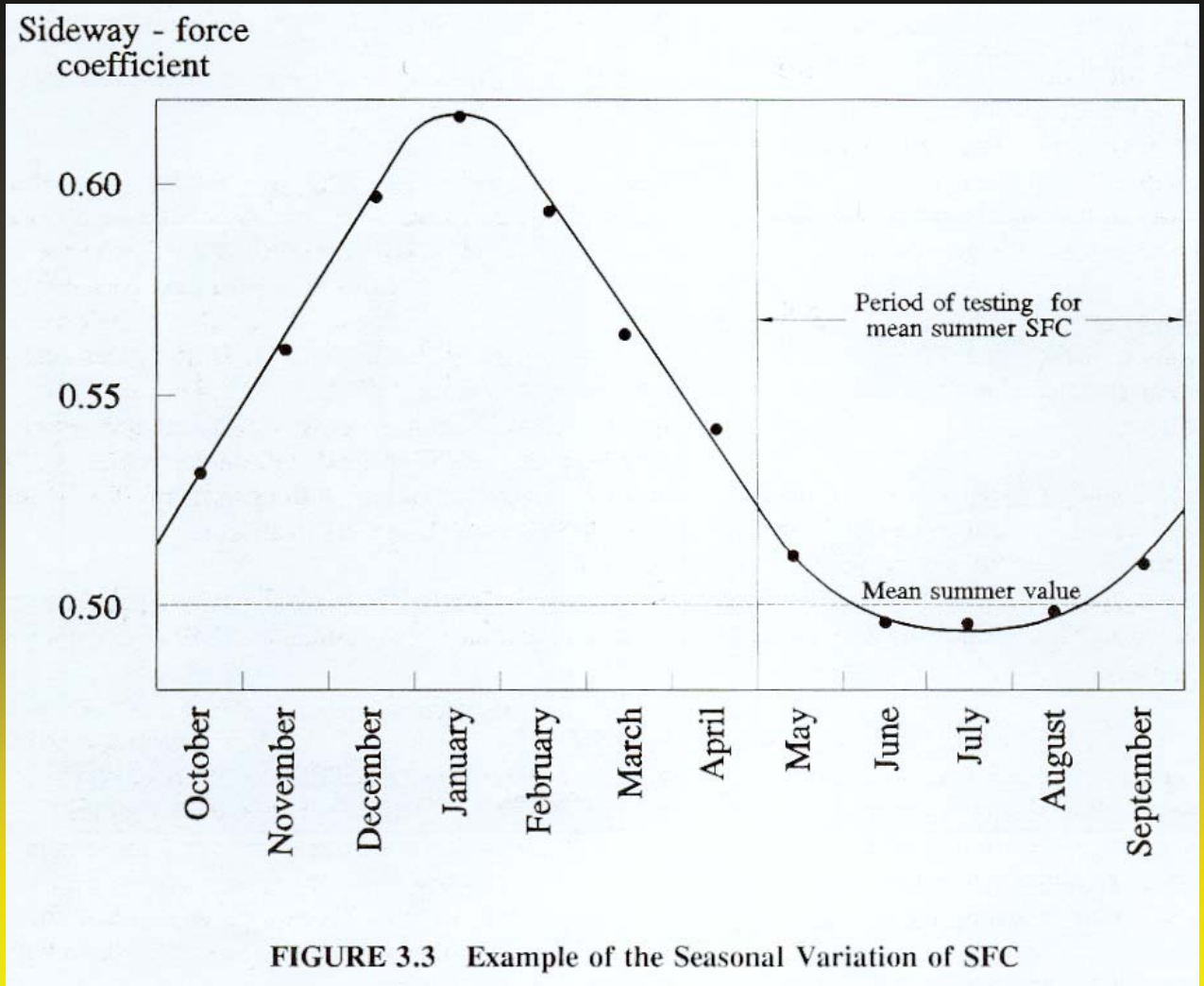

FIGURE 3.3 Example of the Seasonal Variation of SFC

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Litigation issues

Civil Action:

10 years: 8 fold increase- +9% per annum

80%: highway maintenance- Surface is third

New Protocols for Road Death Investigation

Investigate all incidents as "Unlawful Killings" until the contrary is proved

HSE - MORR

EuroRap
(European Road Assessment Programme)

AA Foundation: Get a Grip-Tyres, Road Surfaces & Traffic Accidents

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Litigation issues

Codes of Practices

HD28/04 Management of Skid Resistance

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HD28/04 Management of Skid Resistance

4. Setting Investigation Levels
4.12 Factors:....low texture depth

6. Prioritising of Treatment
6.2 HD36-Surfacing materials for new and maintenance construction (departures)
HD37- Bituminous surfacing materials and techniques
HD38-Concrete surfacing and materials
...retexture-SR and/or Texture Depth

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HD28/04 Management of Skid Resistance

Annex 1: Background information.....
.....road surface properties
A 1.4 Micro & Macro texture
A 1.5 Tabled effect
A 1.8 Traffic/Temp/Surface characteristics
HD29/94 Structural Assessment Methods

A 4.14 Content of Site Investigation-Texture

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Litigation issues

Codes of Practices

HD28/04 Management of Skid Resistance

CSS Guidance Note: Skidding Resistance

Well-maintained Highways
Code of Practice for Highway Maintenance Management
Road Liaison Group July 2005

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9.8 Skid Resistance Survey Requirements

9.8.1 HD28/04 Management of Skid Resistance
CSS Guidance Note: Skidding Resistance
IAN 49/03 or Early Life SR Strategy

9.8.5 Appoint a member of staff to be responsible

9.8.6 SR Policy as part of their HAMP:

the documentation, to be retained to enable implementation of policy to be demonstrated (in court if necessary)

9.8.17 Where skidding resistance is low…
remedial treatment should be prioritised

SA3: % SCRIM surveyed

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Designing for Safety: Skid Resistance

Table 1 Investigatory Levels recommended for the revised HD28

Site category and definition		Investigatory level at 50km/h							
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
A	Motorway class								
B	Dual carriageway non-event								
C	Single carriageway non-event								
F	Approaches to and across minor and major junctions, approaches to roundabouts								
K	Approaches to pedestrian crossings and other high risk situations								
L	Roundabout								
G1	Gradient 5-10% longer than 50m								
G2	Gradient >=10% longer than 50m								
H	Bend radius <500m – dual carriageway								
H	Bend radius <500m – single carriageway								

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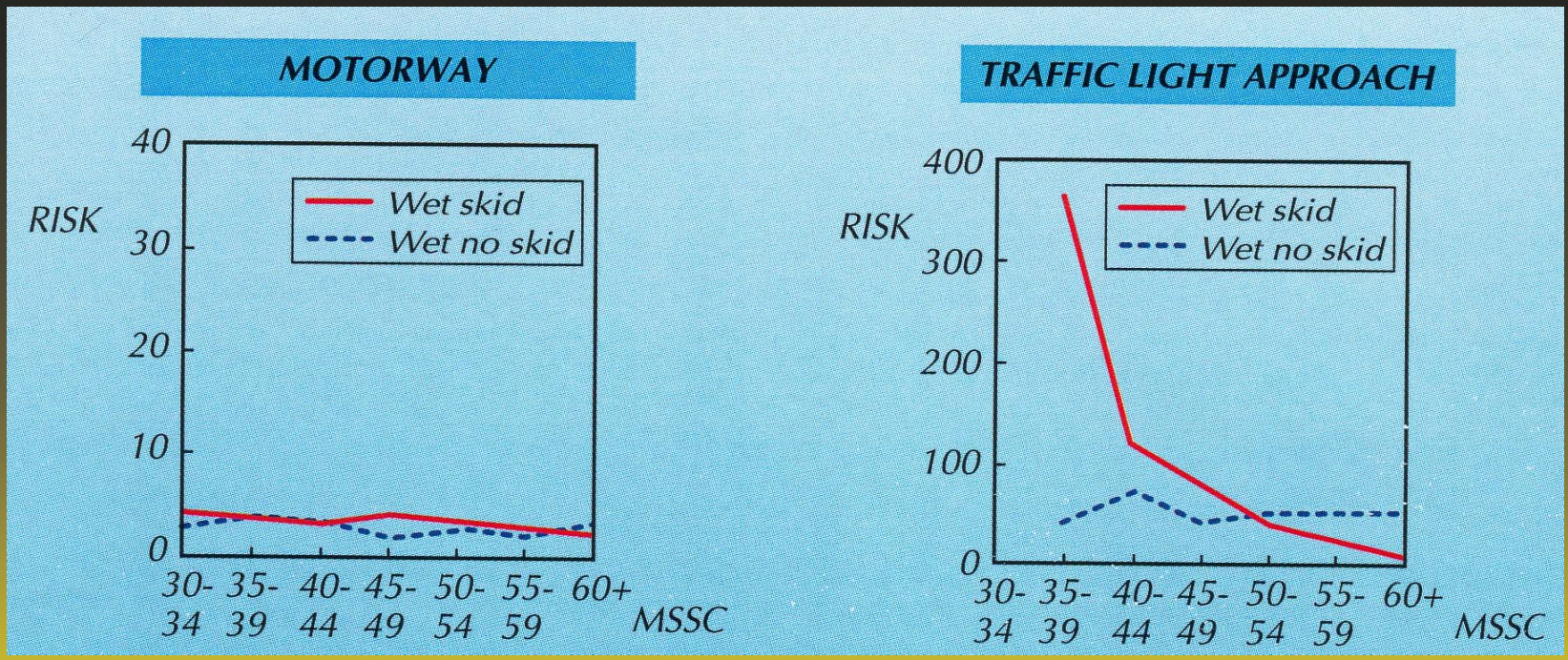
Designing for Safety: Risk



Statistical analysis of site category accident rates determines default SR level

TRL Report 622:
Accidents and the SR standard for strategic roads

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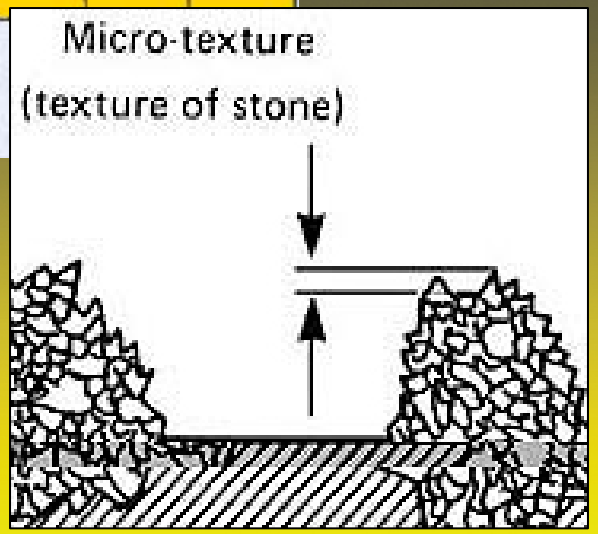
Designing for Safety: Surface

Quality of Aggregate: PSV

	Traffic (cv/lane/day) at design life									
Site Definitions	0-250	251-500	501-750	751-1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000	Over 6000
Motorway (mainline), Dual carriageways (non-event)	50	50	50	50	50	55	60	60	65	65
Motorway mainline, 300 m approaches to off-slip roads	50	50	50	55	55	60	60			



DMRB Vol.7 Sec.5 Ch.3: HD36/06

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Loss of Skid Resistance

Contamination

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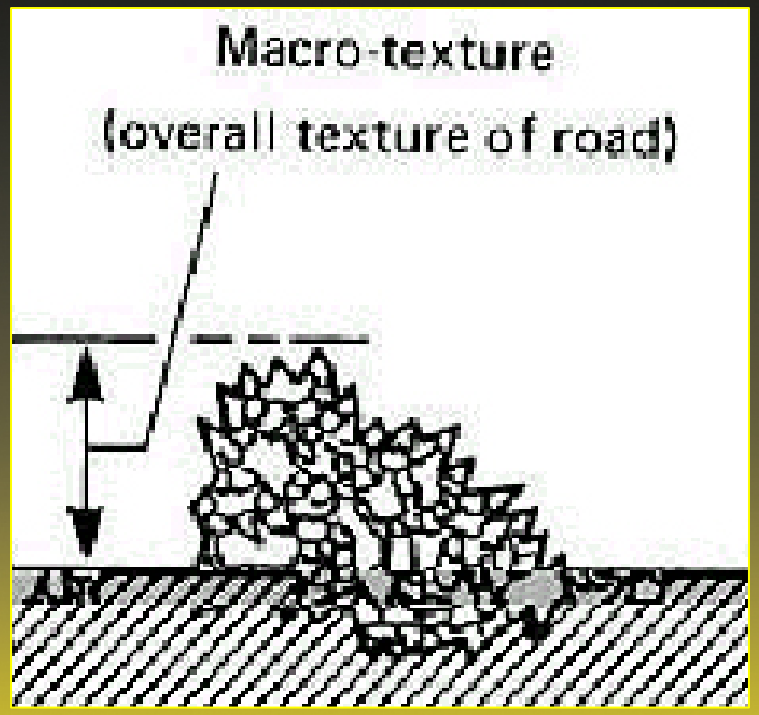
Factors affecting Macro Texture

Surfacing:
- Failure to meet spec
- Over-rolling/mix

Fatting up:
- Curing/Mix
- Multi layers

Aggregate:
- Depression
- Wear

Detritus blockage



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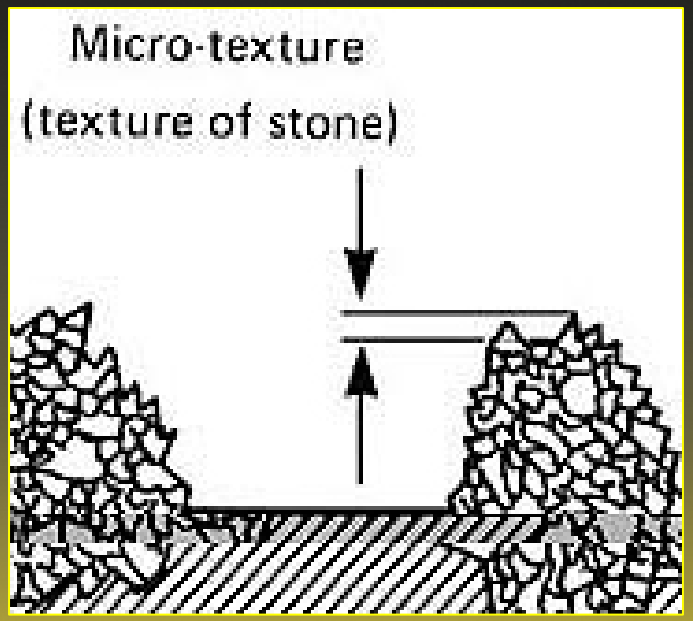
Factors affecting Micro Texture

Contamination:

- Rubber
- Detritus
- Bitumen



Polishing:

- PSV/AAV/Traffic

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The Early Life SR of New Surfaces

Issues

LETTER TO THE EDITOR

SOMETHING TO SAY? *Surveyor* welcomes letters from readers. Our address is 32 Vauxhall Bridge Road, London SW1V 2SS. Fax: 020 7973 6677. E-mail: editorial.surveyor@hemming-group.co.uk. We reserve the right to edit letters for clarity and brevity.

Reassurance needed from industry over SMA doubts

Alleged problems with early life skid resistance on stone mastic asphalt should not

combined with 'enough' texture depth will be 'enough' to deliver the early life skid-re-

'slippery new surface' signs? We could all club together to hire the KJ Law Tester

Skid Resistance during first 3-6 months

Melting of binder film in the dry

Blinding of Microtexture in the wet

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Skid Resistance Testing

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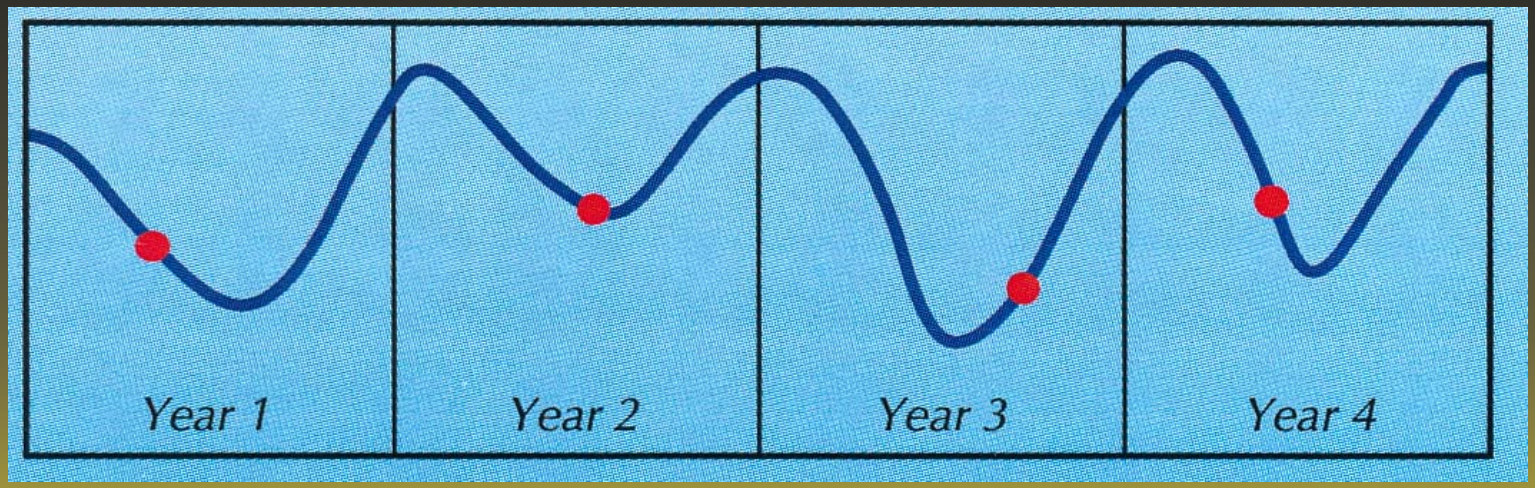
HD 28/04 Management of Skid Resistance



CSC – Characteristic SCRIM Coefficient

Code of Practice for Highways Management:
MSSC,Annual with Benchmark or Annual

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Macro Texture Testing

Sand Patch-Volumetric
1.5mm new

TRACS
1.1 mm SMTD
equivalence

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If it's slippery when wet what can we do?

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Skid Resistance Improvement Options

Slippery Road Signs

High Friction Dress

Surface Dress
Resurface

Recycle

Retexture

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- DMRB Vol.7 Sec.4 Ch 2

  HD 32/94 Maintenance of Concrete Roads

- DMRB Vol.7 Sec.5 Ch 3

  HD 38/97 Concrete Surfacing & Materials

- DMRB Vol.7 Sec.4 Ch 2

  HD 31/94 Surface Treatments

- TRL 298 and 299

  Mechanical retexturing of roads: Process eval. & durability

- DMRB Vol.7 Sec.5 Ch11

  HD 37/99 Retexturing (Bituminous)

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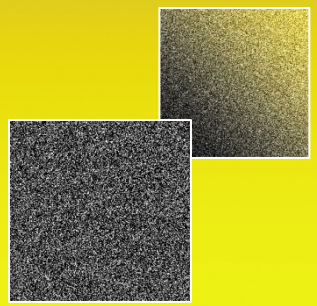
"Retexturing is the mechanical reworking of a sound road surface to restore either skidding resistance, texture depth or both."

"11.5. Advantages include:
a) Conservation of natural resources by reworking an existing surface"



Design Manual for Roads and Bridges(DMRB) – Vol 7

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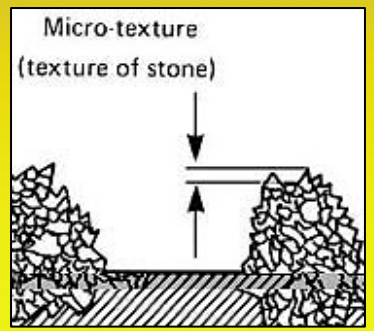
High Specification Aggregate Statistics

Use of NTS has seen HSA annual demand increase from 2.6Mt to 6.1Mt between 92 and 02: +135%

23 HSA quarries in UK of which 13 are in England
HSA imported from outside England increased from 0.92Mt to 2.25Mt: + 145%

Current demand/supply provides for 17 years



"The sustainable use of HSA in SR road surfacing in England"
Capita Symonds 2005

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Retexturing - DMRB

Surfacing type	Original condition: effect required from treatment	Suitability of treatment processes						
		Bush hammering	Shot blasting	Grooving/ grinding	Longitudinal scabbling	Orthogonal grooving	Carbonising	Water-jetting
Chipped rolled asphalt	Polished aggregate: recovery of skidding resistance — good[1] texture	✔	✔	✔	✔	✔	O	O
	poor[1] texture	✔	✔	✔	x	x	O	O
	Embedded chippings: recovery of texture depth — good[2] SR	O	✔	O	x	✔	✔	✔
	poor[2] SR	O	✔	O	x	O	✔	✔
	Excessive noise/ excessive texture — good SR	✔	x	O	✔	x	x	x

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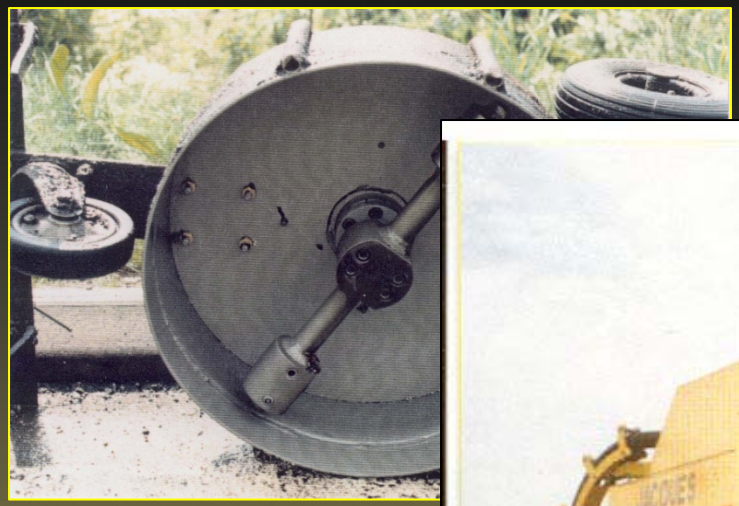
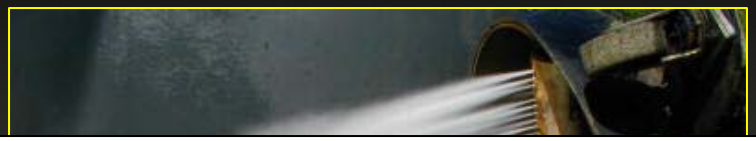
Water Retexturing/Captive Hydrology





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Carbonising

Outside scope of TRL 1994 project

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Grooving

Orthogonal Grooving

Longitudinal Scabbling

Micro-milling

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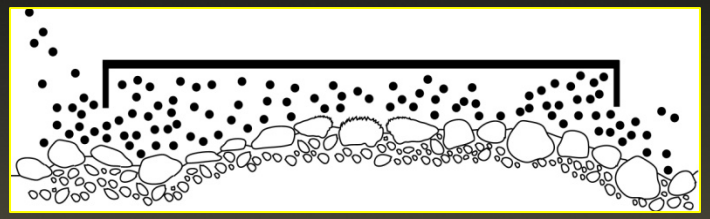
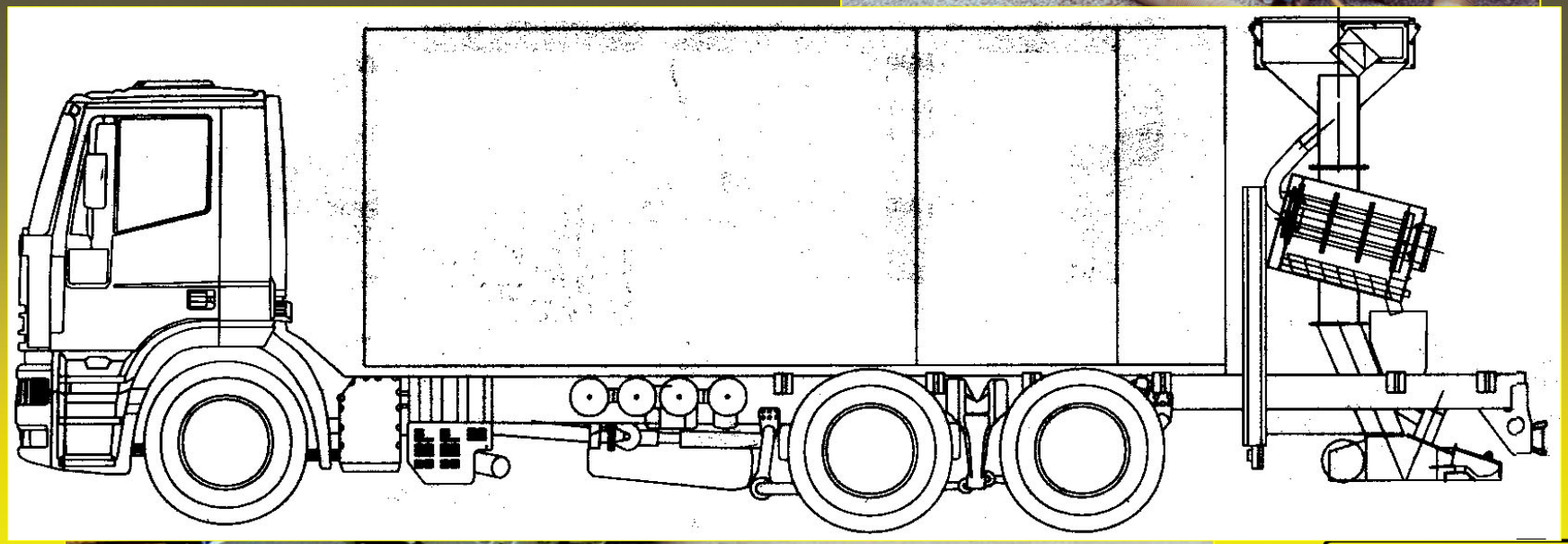
Shot Blasting/Preening





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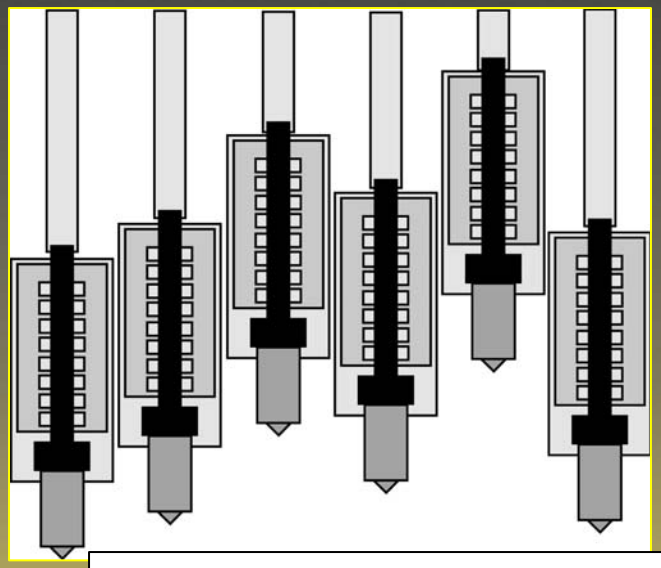
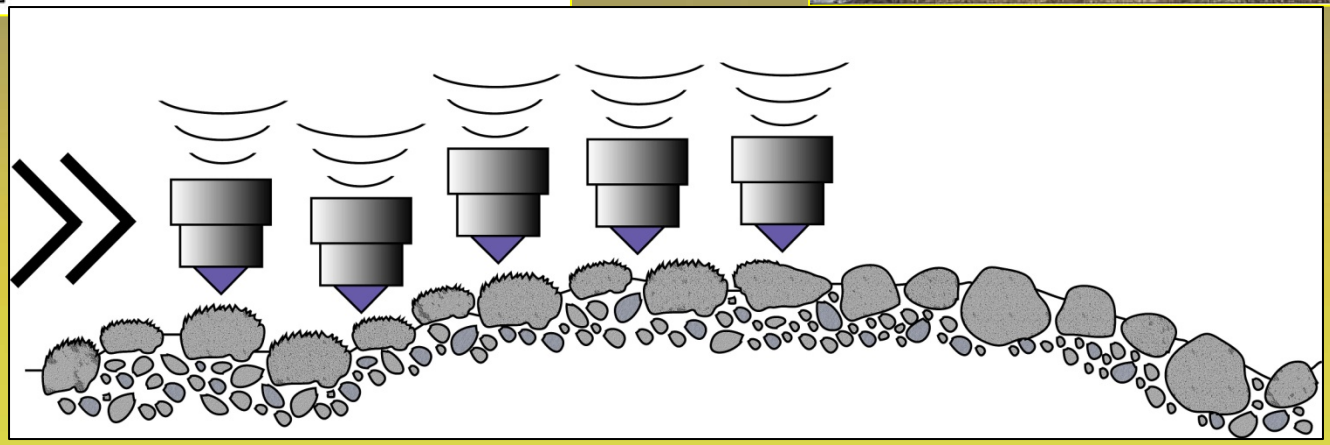
Bush Hammering (Klaruwtex 190)





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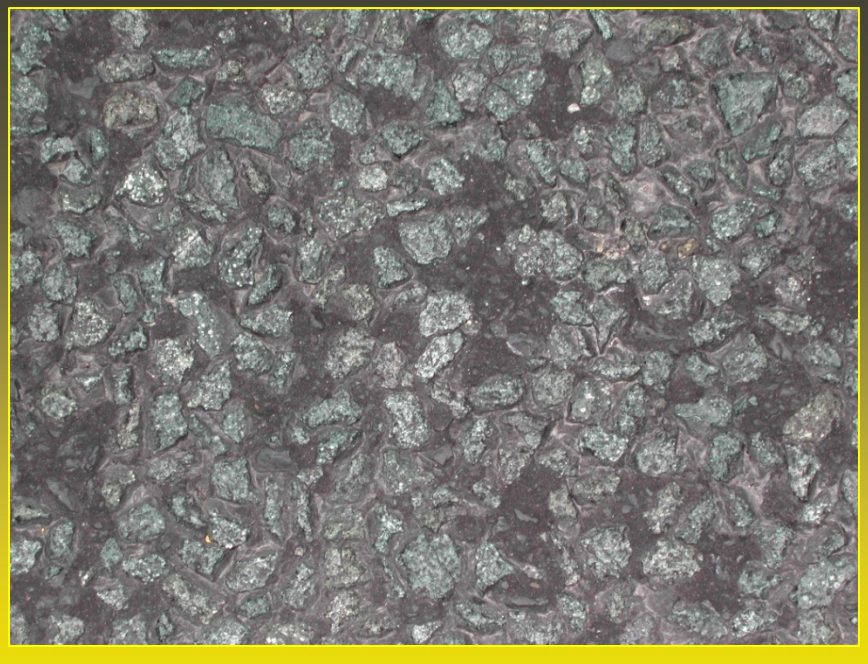
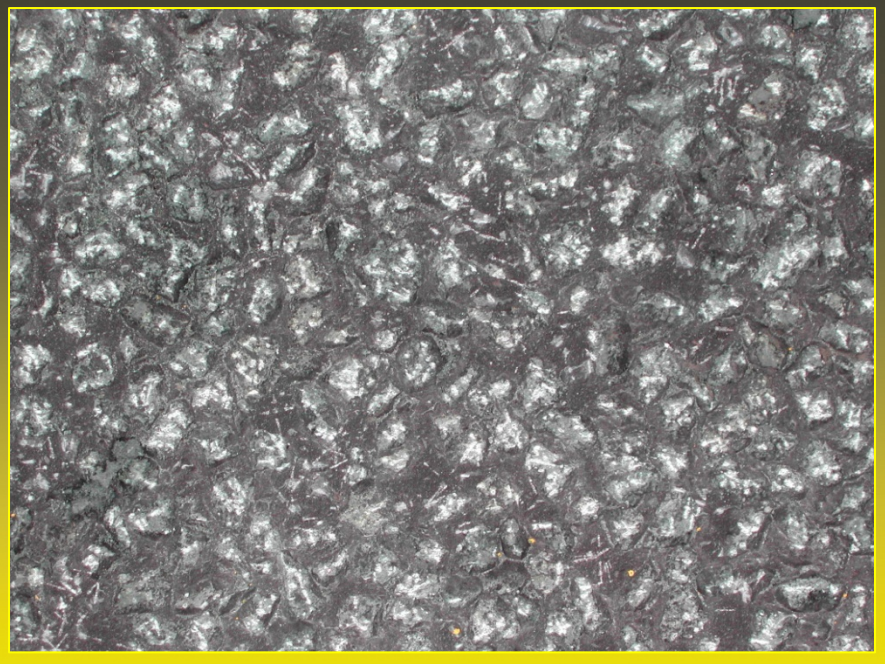
Bush Hammering (Klaruwtex190)

Before



After



The effect

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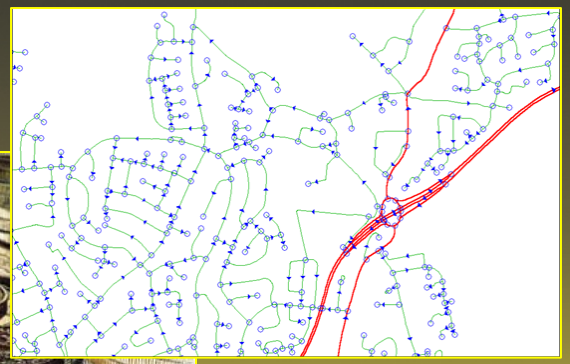
How Retexturing can be used



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Response to SR testing

SCRIM 2001-02 TREATMENT:- RETEXTURING Ref No HR 285

Area 2700

Road	Location	Length	Approx Width	Treatment	Section & chainage
A65 Plan No 13	Between Galegreen and Lanc's boundary	185m	3.6	Retexture	3/74 ch 70 to 255 W/B
		20m	3.6	"	ch 455 to 475 W/B
		20m	3.6	"	ch 715 to 695 W/B
		145m	3.6	"	ch 475 to 620 E/B

Road	Location	Length	Approx Width	Treatment	Section & chainage
A65 Plan No 13	Betw				
A65 Plan No12	Be				
A65 Plan No11					
A65 Plan No10		30m	3.6	"	ch 100 to 130 E/B
A65 Plan No 9	Between A687 and Ingleton	40m	3.6	Retexture	2/08 ch 460 to 500 W/B
A65 Plan No 8	East side of Ingleton	20m	3.6	Retexture	2/58 ch 205 to 225 4/8

KRD/SCRIMTREATMENT A65 2001

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Response to RTAs

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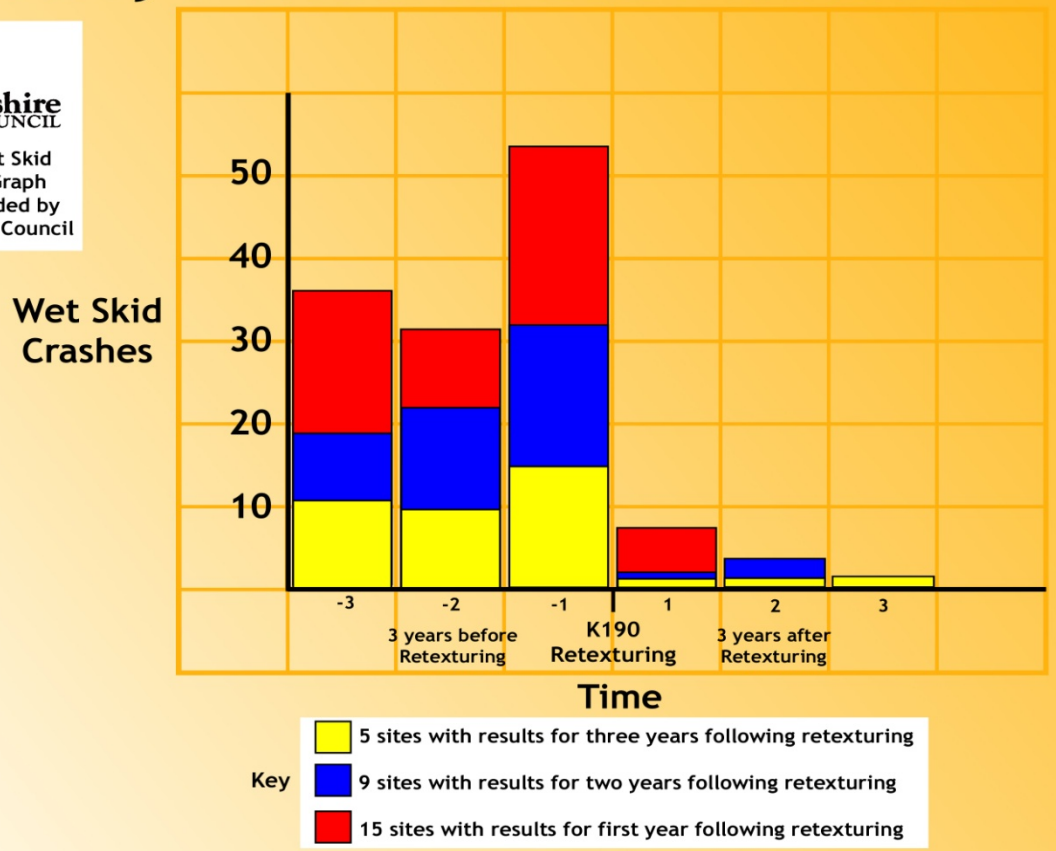
Case Study : Wet Skid Crash Reduction

Hertfordshire COUNTY COUNCIL

Sites chosen on Wet Skid Accident Record. Graph based on data provided by Hertfordshire County Council



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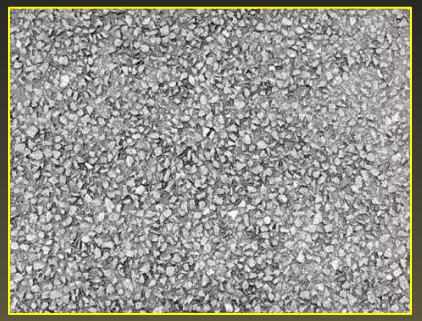
Stop-gap measure

City of BRADFORD METROPOLITAN DISTRICT COUNCIL



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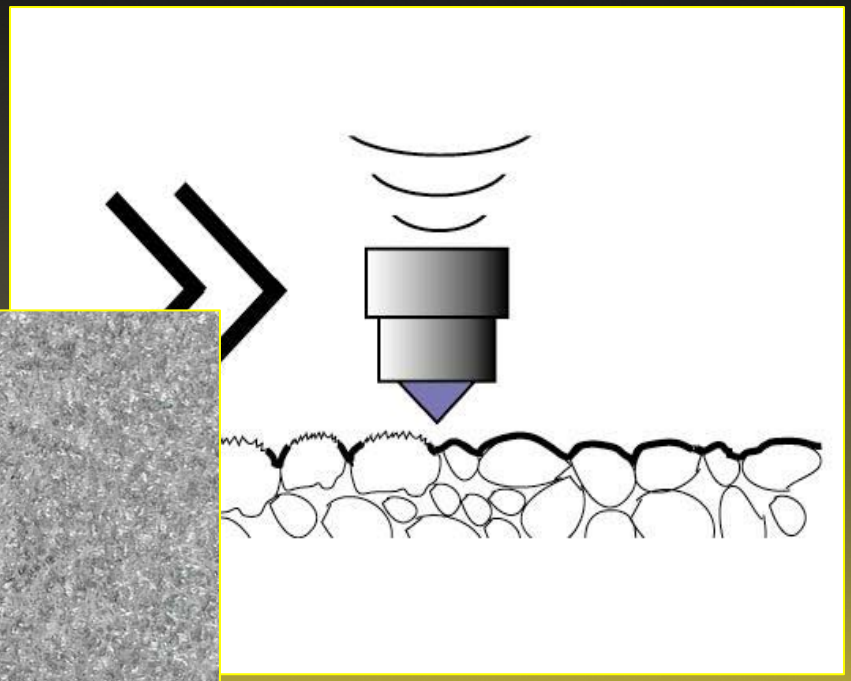
Accelerated Weathering



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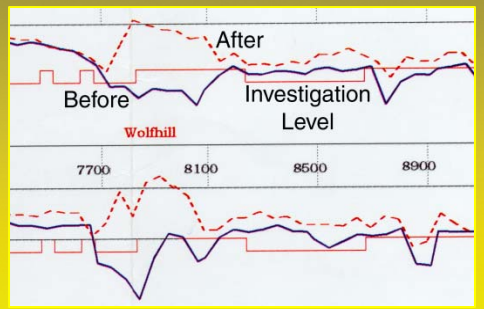
Network Asset Management

- Maintains SR above IL
- Reduces wet skid crashes
- Establishes rate of polishing
- Assists maintenance planning
- Reduces whole life costs



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Retexturing Considerations

DMRB

Repeatability

Drainage

Selectivity

Surface Profile

Speed

Micro or Macro

Surface

Roundabouts

Collateral Damage

Full Lane Width

Weather Dependency

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Why Retexture?

Improve safety and reduce crashes

Make best use of resources

Whole life cost savings

Social and Political obligations

3rd Party Claims/Litigation

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END

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