



## APSE GLASGOW





Leigh Foster  
Specification Manager  
North & Scotland  
Retexturing

- **30 years in Highways**
- **20 years Asphalt Contracting**
- **10 years Bitumen Sales**





## The Low Carbon Alternative Retexturing

Leigh Foster  
Specification  
Manager  
North & Scotland  
Retexturing



# Summary

## Use of the Retexturing Process :

- Save Carbon
- Save Cost
- Save Time
- Extend Service Life
- Improve Skid Resistance
  - Reduce Accidents
  - Reduce Barrier Strikes

## Topics Covered :

- Friction, Material Durability, Testing
- National Standards
- How is Skid Resistance Lost?
- What/Why/Where?
- Benefits

# Factors Affecting Friction

## **Tyre properties**

Type  
Dimension  
Rubber resilience  
Tread pattern and depth  
Pressure  
Stiffness

## **Other factors**

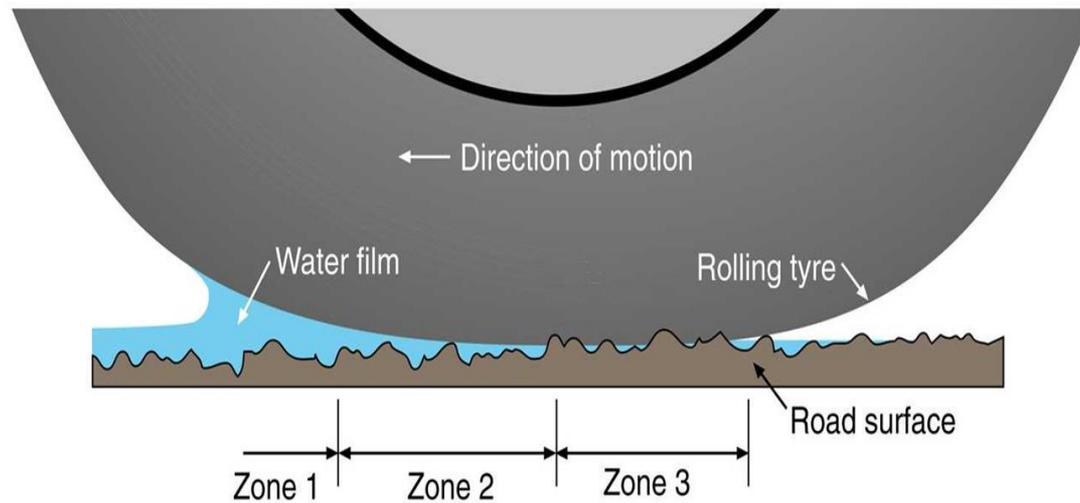
Vehicle speed  
Road surface condition



## **Surface properties**

Microtexture  
Macrottexture  
Material properties  
Construction

# Tyre Contact – Wet Conditions



- Zone 1: Continuous water film
- Zone 2: Interrupted water film
- Zone 3: Dry contact

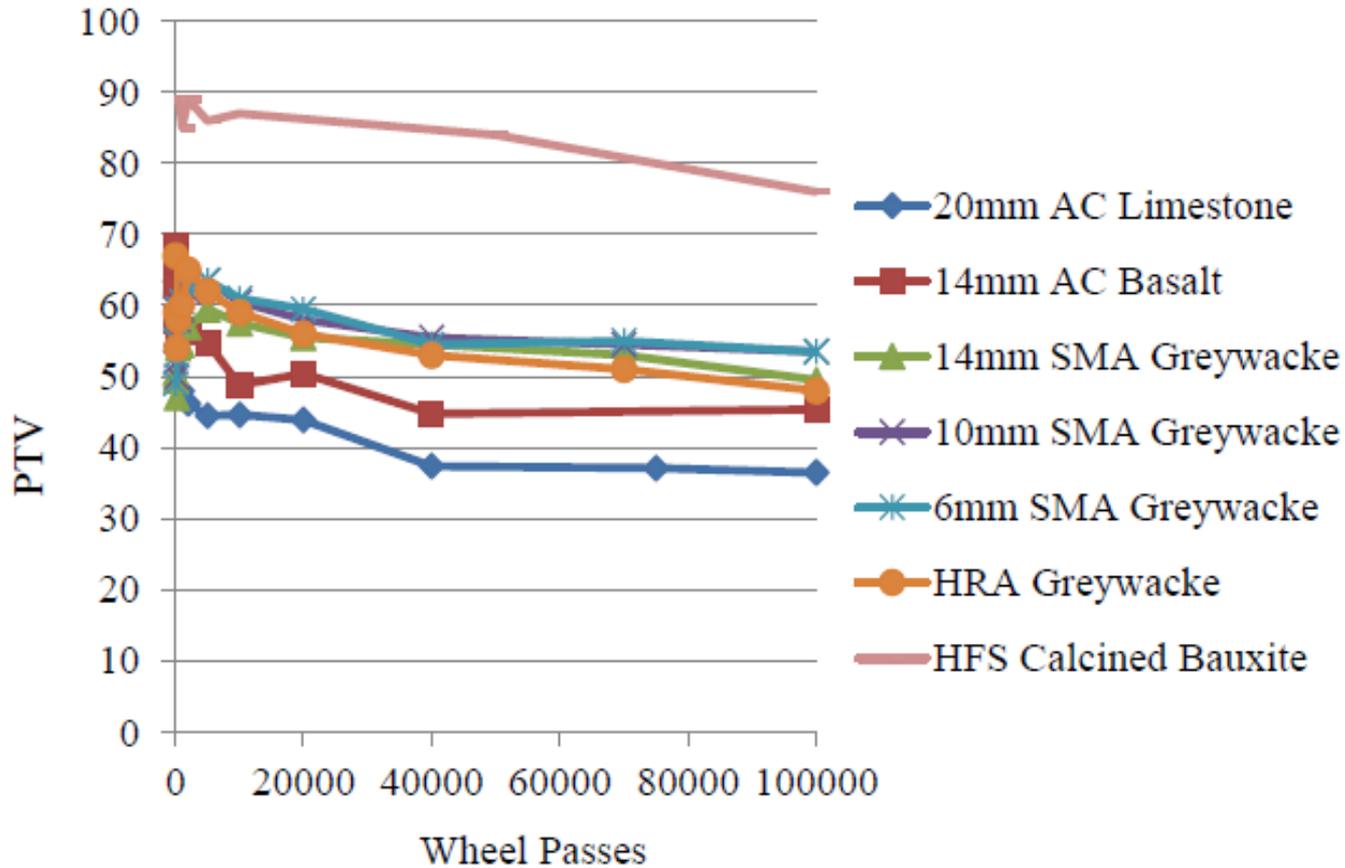
# Material Durability

Skid resistance after simulated trafficking

Testing carried out using the WJ Road Test Machine (APT) for a total of 100,000 wheel passes. Used to simulate slow speed/high stress trafficking in laboratory controlled conditions.



# Average skid resistance after simulated trafficking

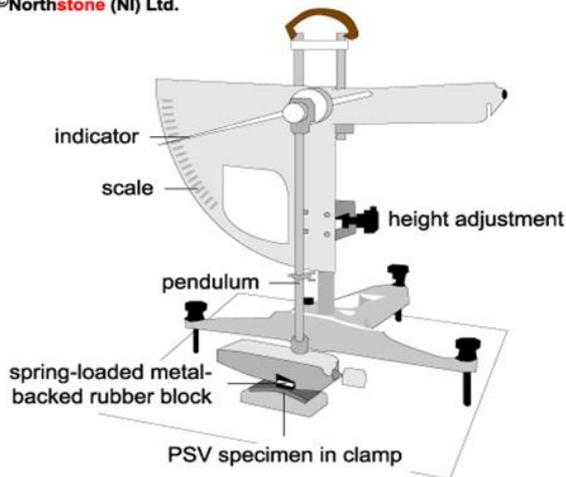


Source - Predicting the Wear of High Friction Surfacing Aggregate Woodward & Friel 2017

# Aggregate Properties

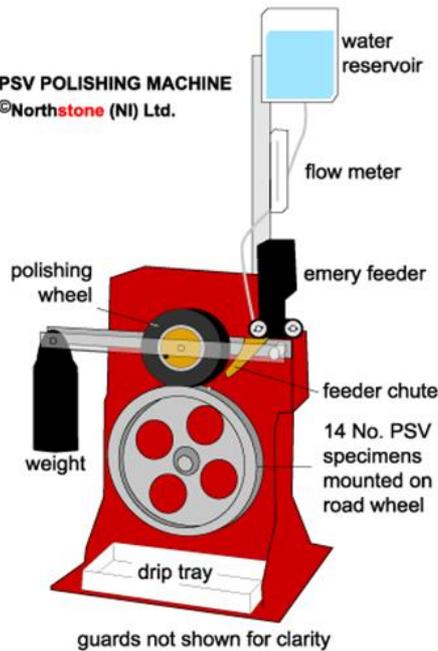
## POLISHED STONE VALUE TESTER

©Northstone (NI) Ltd.

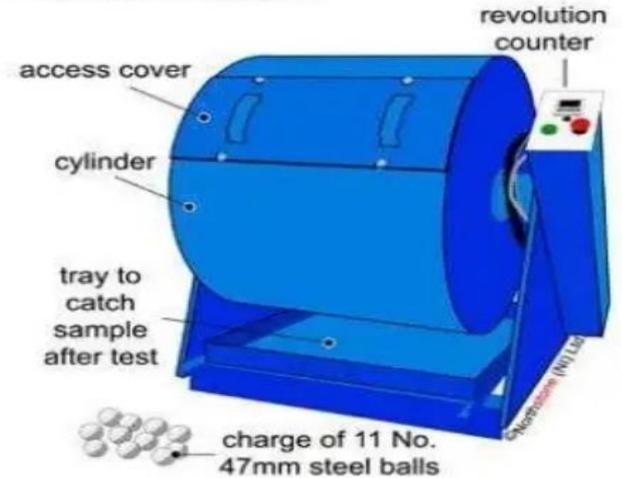


## PSV POLISHING MACHINE

©Northstone (NI) Ltd.



## Los Angeles machine



- Polished Stone Value (PSV) High Value
- Aggregate Abrasion Value (AAV) Low Value

# How is skid resistance lost?

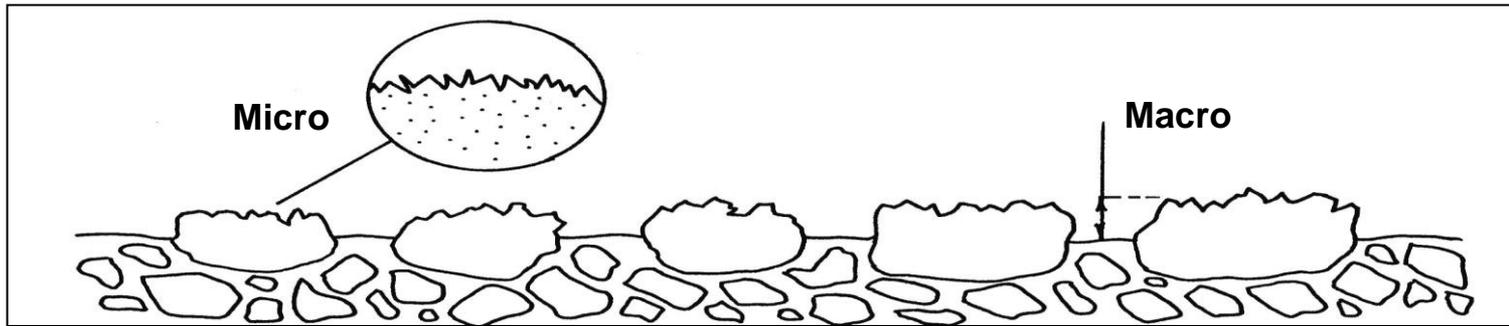
- Increase in traffic volumes
- Aged asset coming to the end of its life
- Build up of bitumen or detritus

When the surface gets worn or becomes contaminated this results in a loss of one, or both of the following:

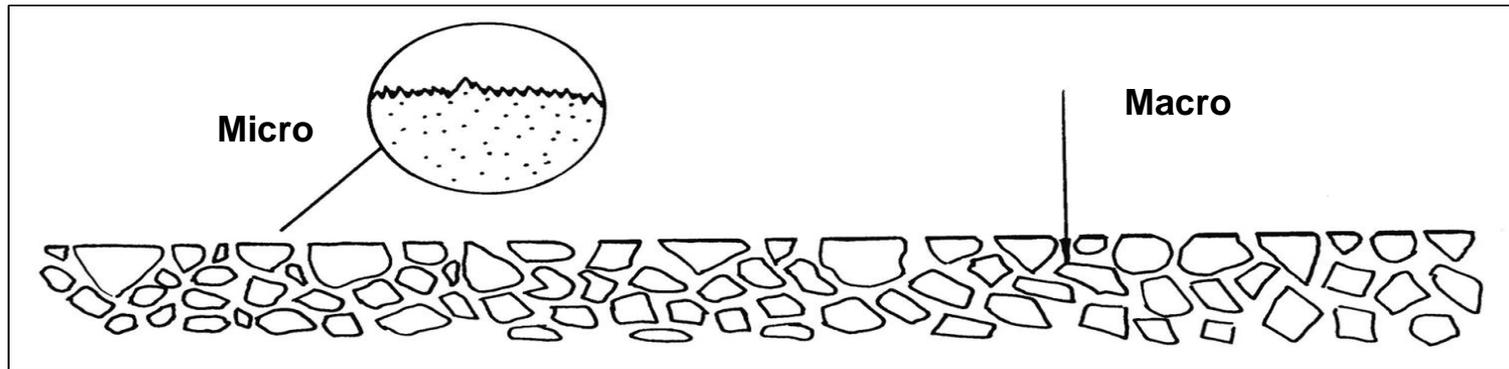
Macro Texture

Micro Texture

# Types of Surface Texture



**Positive  
Texture**



**Negative  
Texture**

# Why Retexture ?



- **Loss of Texture – Standing Water**
- **Polishing/Wearing – SMA Thin S/C**
- **Polishing – HRA with PCC Chips**



# National Standards

## DMRB CD227 Design For Pavement Maintenance

Design Manual for Roads and Bridges



Llywodraeth Cymru  
Welsh Government



Pavement  
Design

### CD 227

## Design for pavement maintenance

(formerly HD 30/08, HD 32/16)

Revision 0

#### Summary

This document describes the requirements to determine the need for maintenance and to design pavement renewals maintenance treatments on the UK motorway and all-purpose trunk roads. This document, along with CS 230, supersedes HD 30/08 and HD 32/16 which are withdrawn. This document includes guidance on retexturing techniques that was formerly in HD 31/94 and HD 37/99. This document, along with CM 231 and CD 236, therefore supersedes HD 31/94 and HD 37/99 which are withdrawn.

#### Application by Overseeing Organisations

Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

#### Feedback and Enquiries

Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: [Standards\\_Enquiries@highwaysengland.co.uk](mailto:Standards_Enquiries@highwaysengland.co.uk)

This is a controlled document.

# National Standards

## DMRB CS228 Skidding Resistance

Design Manual for Roads and Bridges



Pavement  
Inspection & Assessment

### CS 228 Skidding resistance

(formerly HD 28/15)

Revision 2

#### Summary

This document describes the requirements for the provision and management of appropriate levels of skid resistance on UK motorway and all-purpose trunk roads. It describes the requirements for making and interpreting measurements of skid resistance. It also provides a method to identify locations for treatment to improve skid resistance where that treatment is likely to reduce the risk of skidding related incidents in wet conditions. This document is complemented by DMRB document HD 36/15, which sets out the requirements and associated advice on surfacing material characteristics necessary to deliver the required skid resistance properties.

#### Application by Overseeing Organisations

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**This is a controlled document.**

# Scrim & Grip Tester





Leigh Foster  
Specification Manager  
North & Scotland  
Retexturing



## What is Retexturing ?

Retexturing is the mechanical reworking or hydro retexturing of a “sound” asphalt or concrete surface.

The retexturing process restores either skidding resistance, texture depth or both.

# Types of Retexturing

## 1. Captive Shot Blast



## 2. Hydro





Restoring road surfaces to a safe condition in a quick, environmentally responsible, and cost-effective way



Captive Shot Blast  
Retexturing



Hydrotecture Water  
Retexturing



Concrete  
Retexturing



# Captive Shot Blast Retexturing



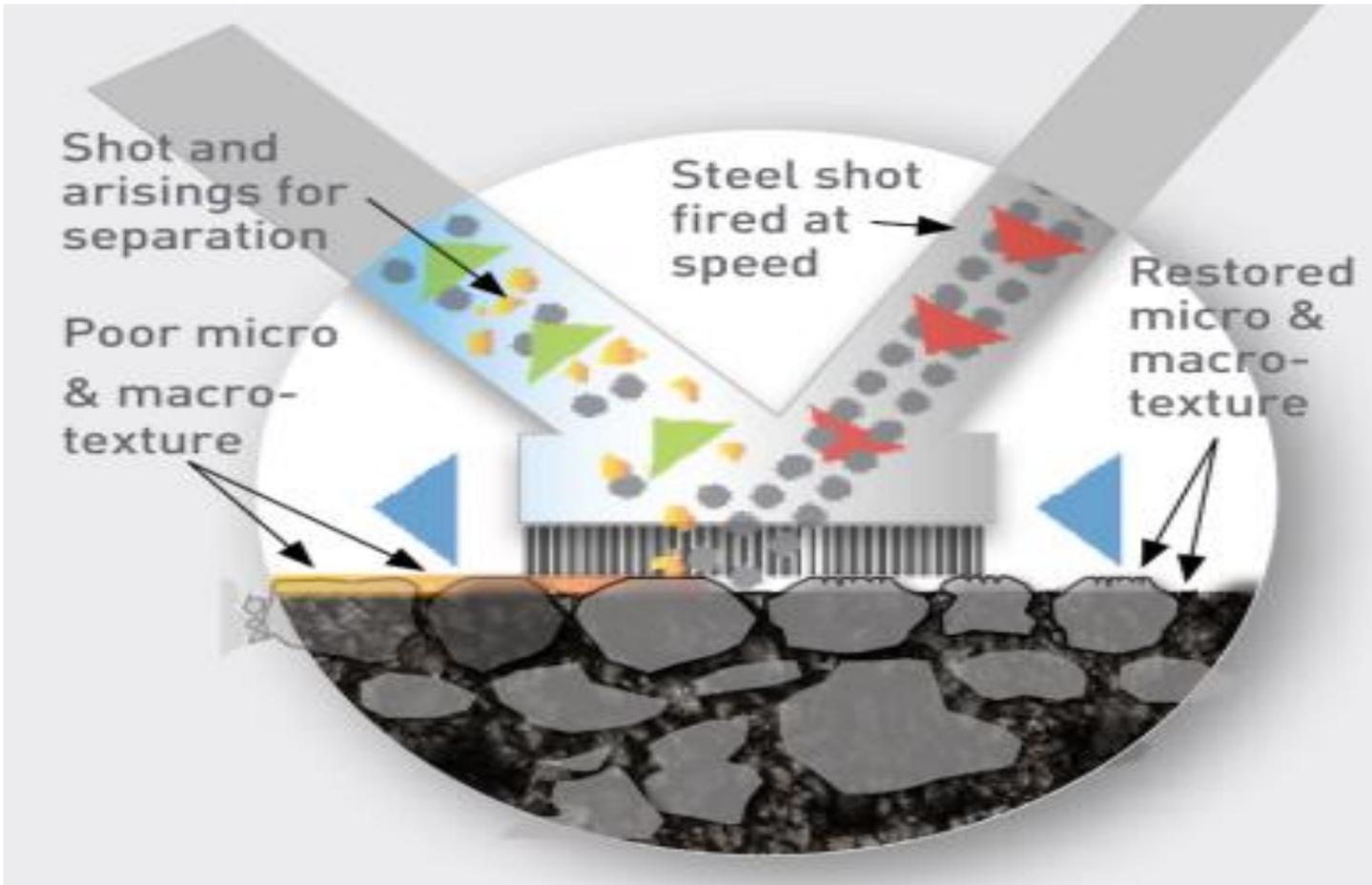
# Captive Shot Blast Retexturing



# Captive Shot Blast Retexturing Time Sensitive Sites



# Captive Shot Blast Retexturing



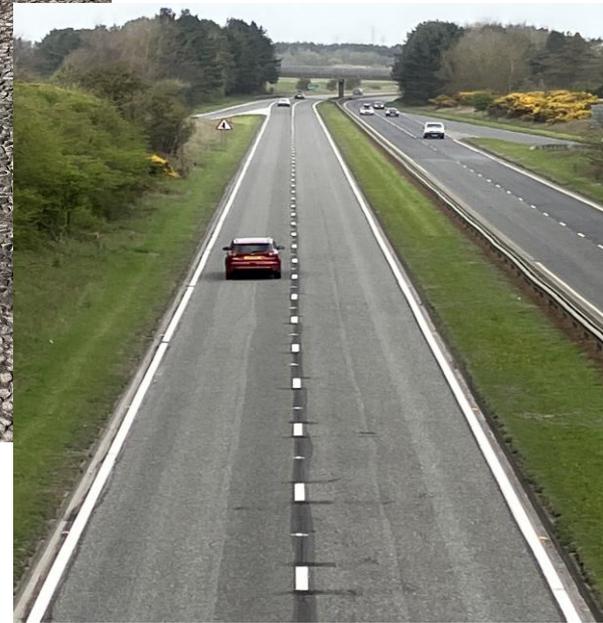
# Video Captive Shot Blasting



## Example of Captive Shot Blast Retexturing



# Northumberland – Captive Shot Blast



# Area 4 – National Highways

Captive Shot Blast Retexturing Scheme February 2012

- Shot Blasting carried out to **350,000m<sup>2</sup>** of the Area 4 National Highways network for Balfour Beatty and Mott Macdonald
- The surface had scored low SCRIM measurements and required intervention
- Both sit on and lorry mounted units were used
- In excess of **1814 tonnes** of Carbon Dioxide saved compared to traditional treatment options
- Over **£7.8m** in savings achieved by not having to plane out surface course, resurface and replace roadmarkings/roadstuds.
- The scheme included roundabouts and difficult to access areas – ideal for sit on machines
- 6 week programme



# Reporting & Testing



## Test Results

## Textureblast Limited

HIGHWAY CONTRACTORS

TO:

Tremayne House  
Westpark  
Wellington

Somerset, TA21 9AD

Tel: 01903 716358

Email: info@textureblast.net

Website: www.textureblast.net

Registered in England No. 5675801

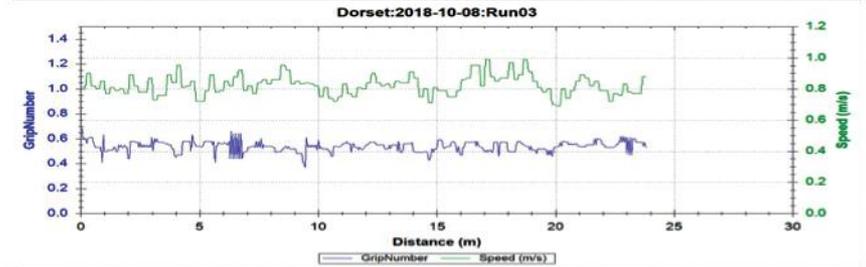
VAT No. 878 6337 65

TEST LOCATION: Site  
ROAD SURFACE: HRA  
PRE TEST DATE: Monday, 8 October  
POST TEST DATE: Monday, 8 October

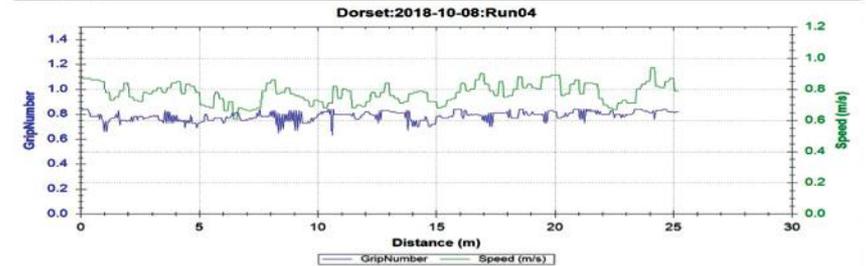
### Determination of Skid Resistance on Wet Surface Using Findlay Irvine Micro GT Griptester

Distance (M)	Latitude	Longitude	Grip No.	Grip No.	Percentage Increase
0	050:55.7324N	002:30.6038W	0.60	0.85	41.67%
5	050:55.7298N	002:30.6026W	0.55	0.75	36.36%
10	050:55.7273N	002:30.6018W	0.52	0.80	53.85%
15	050:55.7246N	002:30.6014W	0.60	0.80	33.33%
20	050:55.7222N	002:30.6013W	0.55	0.85	54.55%
25	050:55.7198N	002:30.6014W	0.53	0.86	62.26%
<b>Average</b>			<b>0.56</b>	<b>0.82</b>	<b>46.57%</b>

### Pre Test Graph



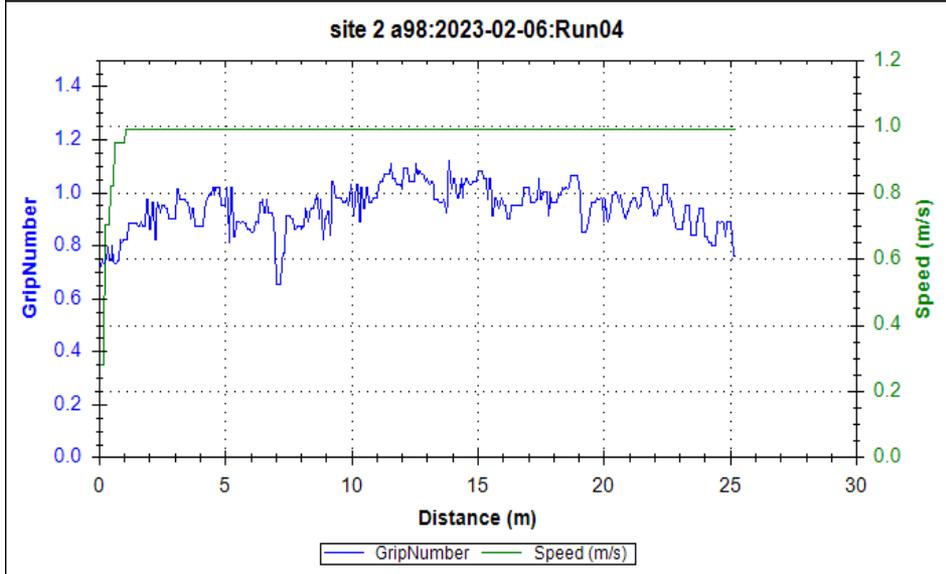
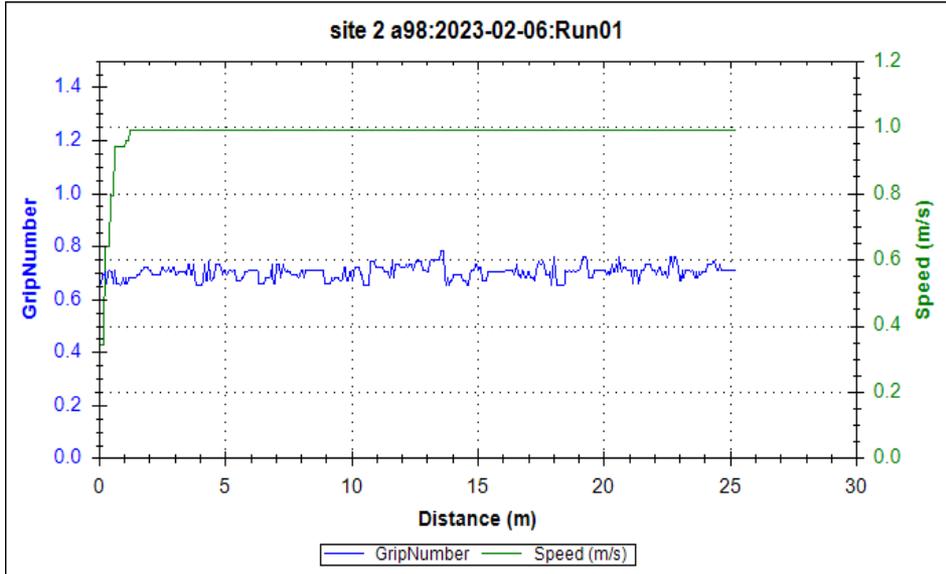
### Post Test Graph



# Aberdeenshire - Site A98 - Captive Shot Blast



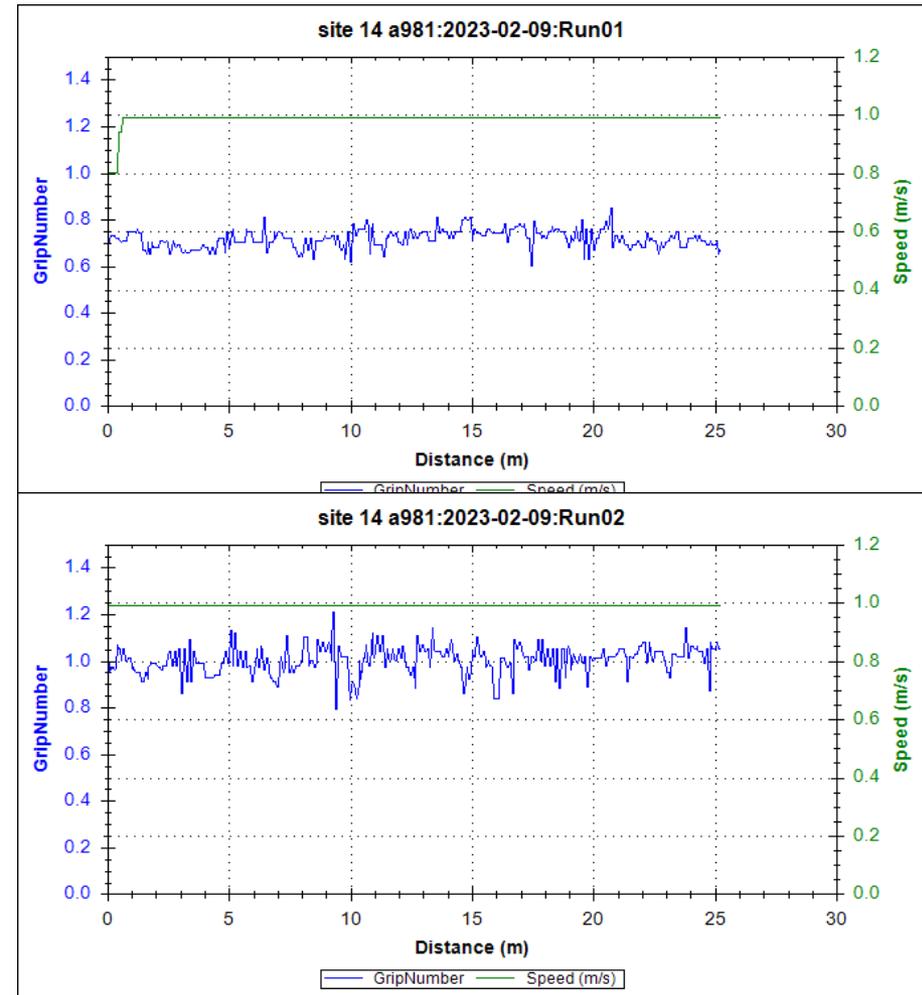
42%



# Aberdeenshire - Captive Shot Blast

Site 14 A981:2023-02-09							
Run 01	Before	0.7	0.71	0.74	0.72	0.69	0.712
Run 02	After	0.99	0.91	0.96	1	1	0.972
Run 03	Before	0.76	0.7	0.67	0.73	0.71	0.714
Run 04	After	0.99	1.02	0.97	1	0.99	0.994
Run 05	Before	0.77	0.73	0.77	0.75	0.81	0.766
Run 06	After	1.01	1.02	0.99	1.03	1	1.01
Run 07	Before	0.71	0.74	0.7	0.68	0.64	0.694
Run 08	After	0.9	1.01	0.97	0.95	1.06	0.978
						Before	0.72
						After	0.99
						Increase	0.27
						%	37%

37%





**Captive Shotblasting**

**6 years**

**Captive Shotblasting**

**5 years**

Determination of Skid Resistance on Wet Surface Using Findlay Irvine Micro GT Griptester

Wiltshire County Council

Site:	Rank 42 A342 Old Derry Hill		Pre Test	Post Test	Post Test
Road Surface:	HRA		11/03/2016	04/05/2016	16/02/2022
Distance (M)	Latitude	Longitude	Grip No.	Grip No.	Grip No.
0	051:26.2604N	002:04.2889W	0.85	1.04	1.00
5	051:26.2625N	002:04.2921W	0.79	0.93	0.91
10	051:26.2643N	002:04.2948W	0.77	1.02	0.86
15	051:26.2662N	002:04.2977W	0.83	0.95	0.87
20	051:26.2682N	002:04.3007W	0.77	1.01	0.81
25	051:26.2704N	002:04.3036W	0.78	1.05	0.82
<b>Average</b>			<b>0.80</b>	<b>1.00</b>	<b>0.88</b>

Site:	RT0017 A4 Bath Road Box at County Boundary		Pre Test	Post Test	Post Test
Road Surface:	Surface Dressing		17/05/2017	17/05/2017	16/02/2022
Distance (M)	Latitude	Longitude	Grip No.	Grip No.	Grip No.
0	051:24.5050N	002:17.449W	0.88	0.99	0.92
5	051:24.5068N	002:17.425W	0.87	1	0.91
10	051:24.5084N	002:17.394W	0.89	1.03	0.96
15	051:24.5113N	002:17.363W	0.82	1.02	0.94
20	051:24.5133N	002:17.330W	0.86	1.02	0.93
25	051:24.5147N	002:17.302W	0.88	1.02	0.92
<b>Average</b>			<b>0.87</b>	<b>1.01</b>	<b>0.93</b>

Determination of Skid Resistance on Wet Surface Using Findlay Irvine Micro GT Griptester

Dorset County Council

**Captive  
Shotblasting**

**4 years**

Site:	Portland Road, Weymouth		Pre Test	Post Test	Post Test
Road Surface:	SMA		21/03/2018	21/03/2018	17/02/2022
Distance (M)	Latitude	Longitude	Grip No.	Grip No.	Grip No.
0	50.58899	-2.472518	0.76	1.05	0.97
5	50.588947	-2.472468	0.83	0.90	0.94
10	50.588903	-2.472435	0.75	1.00	0.97
15	50.588863	-2.472413	0.78	0.94	0.88
20	50.588823	-2.472387	0.81	0.98	0.84
25	50.588787	-2.472368	0.88	0.87	0.92
		<b>Average</b>	<b>0.80</b>	<b>0.96</b>	<b>0.92</b>

Site:	Preston Road, Preston		Pre Test	Post Test	Post Test
Road Surface:	SMA		21/03/2018	21/03/2018	17/02/2022
Distance (M)	Latitude	Longitude	Grip No.	Grip No.	Grip No.
0	50.646695	-2.419315	0.69	0.96	0.78
5	50.646697	-2.419387	0.65	0.91	0.84
10	50.646695	-2.419463	0.65	0.8	0.8
15	50.646702	-2.419525	0.62	0.95	0.85
20	50.6467	-2.419592	0.63	0.87	0.81
25	50.6467	-2.419667	0.65	0.85	0.86
		<b>Average</b>	<b>0.65</b>	<b>0.89</b>	<b>0.82</b>



# Case Study – Transerve SW Contract Transport Scotland

A78 B7047 Junction to Montfode Rbt										Average Grip No. & Weeks after Retexturing					
Route	Site Name	Direction	Approx. Section Extents Tested	Approx. Distance Tested	Surfacing Type	Date of Surfacing	Traffic - AADF (for appropriate Lane)	Traffic Source	Date of Test	15/03/2016	12/04/2016	25/07/2016	25/01/2017	14/08/2017	28/08/2018
									Date of Retexturing	0	3	18	44	73	127
A78	Montfode	SB (CL1)	14040/07 Ch1720-2160	440	HRA	unknown	3992	IRIS	18/03/2016	0.61	0.84	0.75	0.81	0.6	0.6
A78	Montfode	NB (CR1)	14040/07 Ch2160-1720	440	HRA	unknown	3948	IRIS	18/03/2016	0.69	0.8	0.78	0.86	0.61	0.68

A8 Bullring Rbt to Cartsburn Rbt										Average Grip No. & Weeks after Retexturing					
Route	Site Name	Direction	Approx. Section Extents Tested	Approx. Distance Tested	Surfacing Type	Date of Surfacing	Traffic - AADF (for appropriate Lane)	Traffic Source	Date of Test	11/04/2016	20/04/2016	25/07/2016	26/01/2017	14/08/2017	28/08/2018
									Date of Retexturing	0	1	15	41	70	124
A8	Bullring	NB (CL1)	13870/24 - Ch. 0 - 158m	158	HRA	unknown	5652	IRIS	14/04/2016	0.56	0.82	0.85	0.7	0.79	0.64

Captive Shotblasting      2 years



# Effectiveness of Retexturing

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Feedback on effectiveness had previously been largely anecdotal informed by the absence of sites from subsequent priority lists.

# Effectiveness of Retexturing

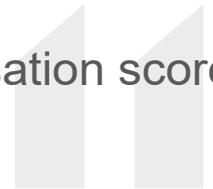
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Until...



TRANSPORT  
SCOTLAND  
CÒMHDAHAIL ALBA

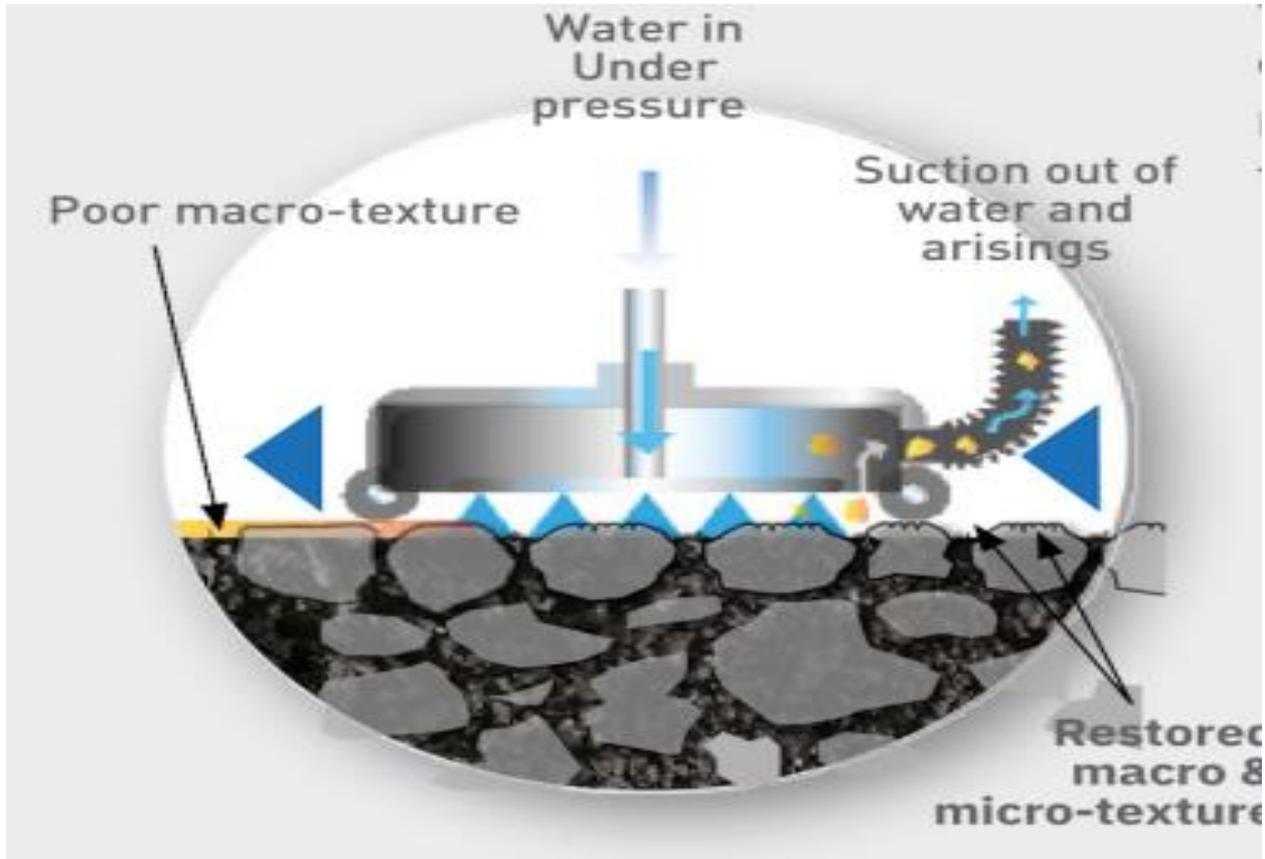
- On average retexturing reduced TS SCRIM prioritisation score (often enough to remove the need for investigation)
- Benefits can last **2 - 4 years**
- Site category doesn't appear to be strong influence on performance
- From limited data original PSV has influence
- Retexturing is a lower carbon option than resurfacing  
(RSTA 0.357/ SD 0.825/ Resurface 4.567)
- Asphaltic materials respond better than surface dressing



## 2. Hydro Retexturing



# Hydro Retexturing



# Hydro Retexturing

Typical rural roads that have been surface dressed and become “fatty”.

To remediate fatty surface dressing is very costly. Options are Insitu or Exinsitu recycling techniques

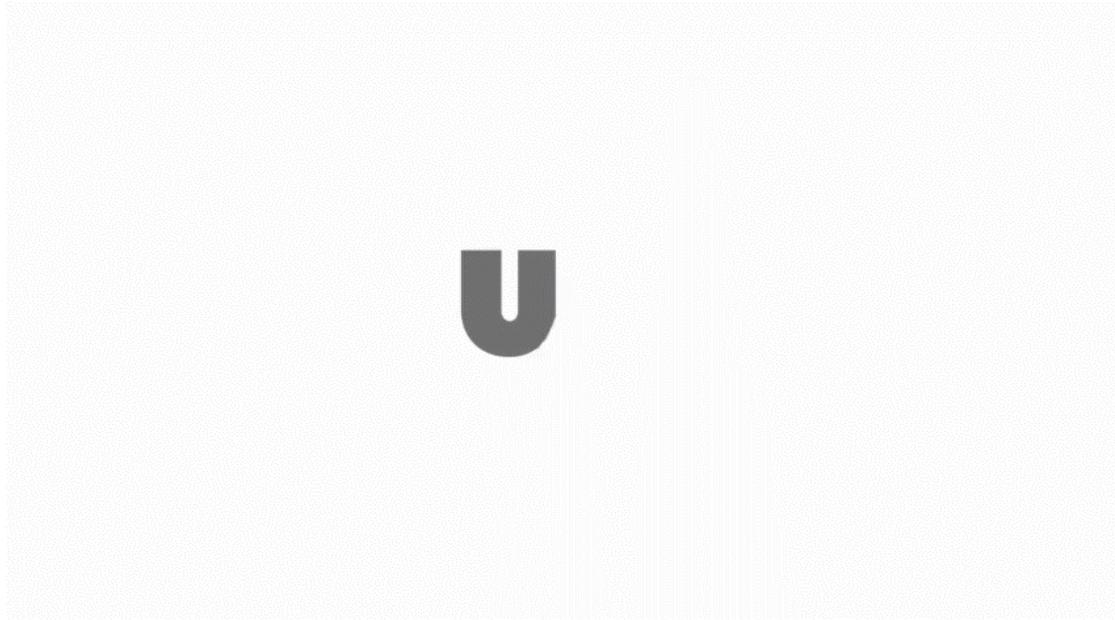
It is likely using recycling techniques you will encounter tar. In today's economic climate it's a costly option and difficult to justify financially.

The Hydro retexturing Process is both carbon and cost efficient and will remove the excess fatty binder. It cleans out the texture and exposes the aggregate, restoring skid resistance (micro & macro-texture).

Provides a low- cost solution to an awkward and potentially dangerous problem.



# Video Hydro Retexturing Machine



## Example of Hydro-Retexturing



## Kelso - Hydro-Retexturing



# Lincolnshire - Hydro-Retexturing





## Carbon Saving



# Carbon Saving

## Independent Life Cycle Assessment Report (LCA) In accordance with ISO 14040 ISO 14044

Verification Report/Statement  
Life Cycle Analysis Verification

LUCIDEON

### Textureblast Limited

Tremayne House, Westpark, Wellington, Somerset, TA21 9AD

**Verification Criteria:** Principles of ISO 14040:2006 & ISO 14044:2006  
"Environmental management - Life cycle assessment"  
ISO 14065:2013  
"Requirements for Greenhouse Gas Validation and  
Verification Bodies for use in Accreditation or Other Forms  
of Recognition"

**Product or Service Verified:** "Partial Life Cycle Assessment Analysis Report on  
Textureblast Operations, version 5" (the LCA Report)

#### Objectives

Textureblast Limited have developed a life cycle analysis report for determining the gate-to-gate CO<sub>2</sub> emissions for the Textureblast service.

Lucideon CICS have been contracted by Textureblast Limited to verify that the report is free from material errors and use assumptions based on robust source information.

#### Scope of the Verification

The scope of the verification covers the gate-to-gate life cycle assessment from Textureblast Limited's gate to the client's gate. The latter is on-site on roads requiring this service/product.

The verification does not address the accuracy of the footprints provided by individual suppliers or other documentation as referenced in the LCA report but can be taken to assure that the calculations are based on robust/ best available source data.

Page 1 of 2

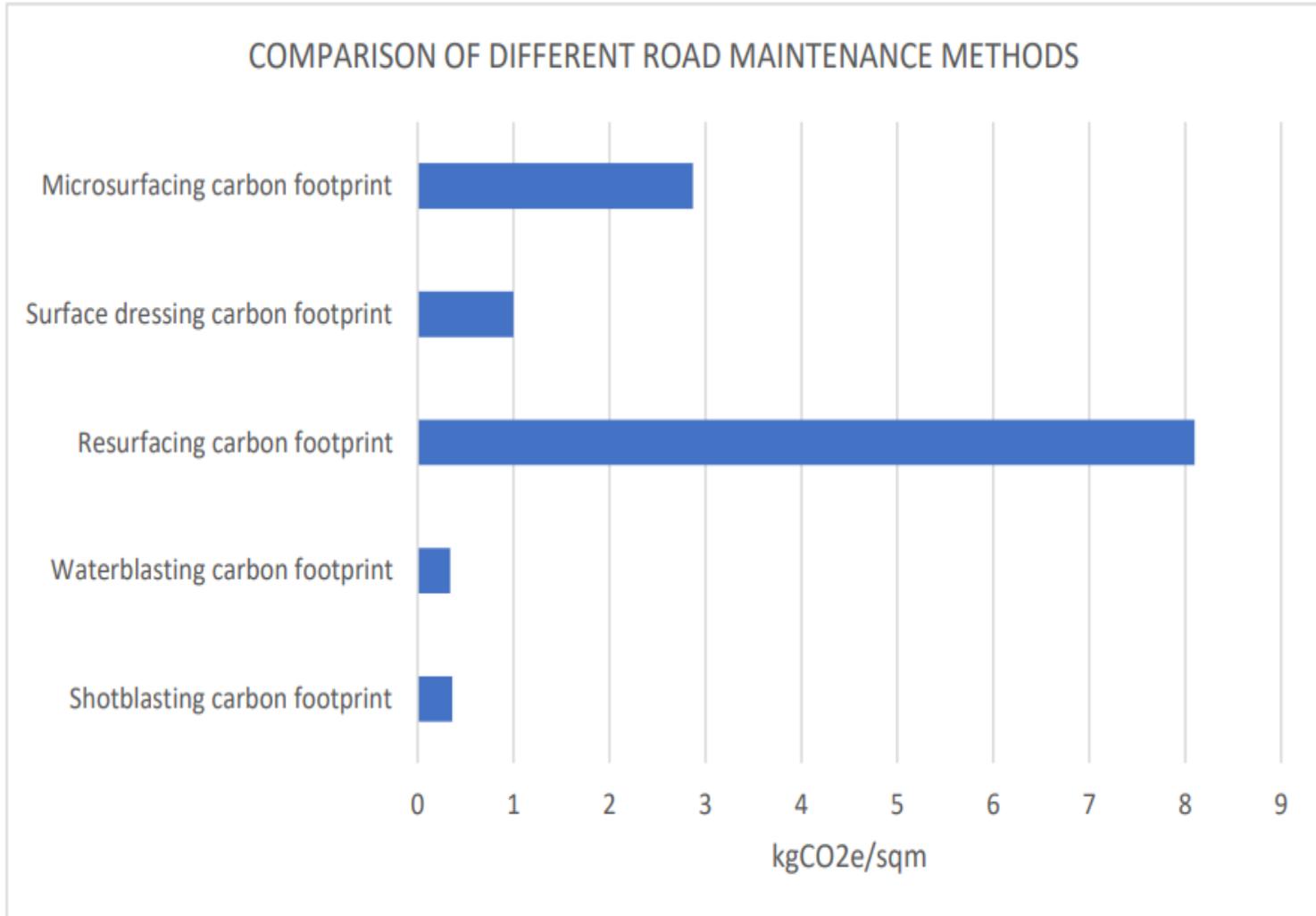
Wherever this verification opinion is displayed both pages shall be made available

This Assurance Statement is granted subject to conformance with the conditions of contract governing the verification.  
Further clarifications regarding the scope of this certificate may be obtained by consulting the organisation.

Lucideon CICS Limited  
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Stoke-on-Trent  
Staffordshire ST4 7LQ, UK  
T +44 (0)1782 411008  
support@lucideon.com  
www.lucideon.com  
Reg. England 1871628



# Carbon Footprint Comparison



## Sustainability & Retexturing

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To produce 100,000 tonnes of 10/14mm single size aggregate you would have to extract & crush **1 Million tonnes of rock.**

# Carbon Saving Comparison

4,000 sqm.

## Resurfacing

22 tonnes of CO<sub>2</sub> produced in asphalt production\*\* .

\*\*Not including the milling and laying process

## Retexturing

Captive Shotblasting – **1.27 tonnes** of CO<sub>2</sub> produced

Hydro retexturing - **1.24 tonnes** of CO<sub>2</sub> produced

95%



# Cost Saving Comparison

4,000 sqm.

Resurfacing with 40mm of high psv surface course  
@ £20-25 per sqm  
£80 -100,000

Retexturing  
@ £4.00 per sqm  
£16,000

86%



# Further Benefits of the Retexturing Process



Prevent barrier strikes with their resultant costs of £4-6k per incident.



Will maximise the use and performance of the high psv surface course originally invested in.

**Immediately takes a red road out of investigatory level.**  
Giving an authority time to decide on best course of action.

# Customers & Areas Worked

## **Strategic Road Network**

**Transport Scotland/Amey/Bear  
National Highways**

**Locations : Forth Road Bridge/A1/M876/A985/A92/A9/A82**

## **Local Authority Network**

**Angus/Aberdeenshire/Borders/East  
Dunbartonshire/Lincolnshire/Leicestershire/Staffordshire/Cornwall**

**Locations : A699/A90/A92/A98/A7**



Questions ?





WJ Group  
Web: [www.wj.uk](http://www.wj.uk)

