OmniCrete

OMNIGRIPHF HIGH FRICTION

THE SCIENCE OF SKID RESISTANCE

In light of public safety expectations on our highways and the consistent road safety push to reduce road trauma the use of high friction road surfacing systems is becoming more prevalent as it reduces breaking distances, reduces threshold speeds and is proven to save lives.

However the question always remains:

How does the engineer ensure that the system they specify and install will meet their expectations and provide best value over a design life of 10 years or more?

The answer is in the design certification and by following a few basic engineering guidelines the client can be assured that the applied product will meet the necessary criteria encompassing high skid resistance for the entire design life which in most cases exceeds 10 years **

System Design Considerations:

1. Type of Treatment — The surfacing system is primarily engineered & designed as a high friction surfacing treatment to reduce skidding related incidents, reduce stopping distances and hence threshold impact speeds.

2. Skid Resistance: — The system should be designed to ensure that the skid resistance of the system remains at the required level for the design life of the system.

3. System Performance: — The binder used must hold the aggregate permanently in position and not dislodge even under the heaviest of braking and as such the system must be of a proven performance level to ensure the client obtains not only the safest systems but obtains best value in terms of value for money and system performance and longevity.

(** Subject to traffic types and volumes)

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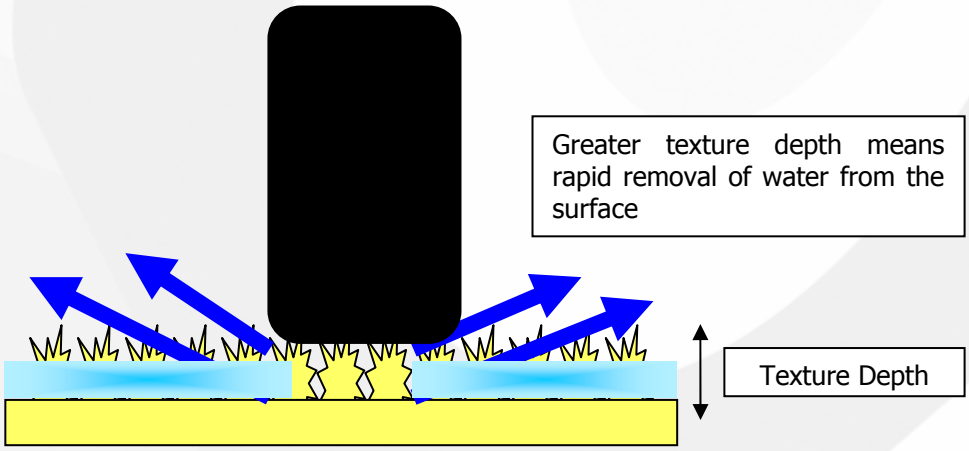
What is SKID RESISTANCE?

1. Maintaining adequate friction between vehicle tyres and surfacing is paramount to safety.
2. Skid resistance in the dry is substantially better than in the wet
3. The properties that effect skid resistance are Texture Depth & Micro Texture

How does TEXTURE DEPTH & MICRO TEXTURE effect the skid resistance?

1. Texture Depth assists in the rapid removal of water from the contact point allowing the Micro Texture to penetrate the vehicle tyre.
2. In wet conditions, the greater the texture depth the better the contact point
3. Micro Texture defines the degree of friction between the tyre and the contact surface and thus the degree of skid resistance
4. The longevity & effectiveness of the Micro Texture is defined by the aggregate's resistance to polishing
5. An aggregate's resistance to polishing is defined by its polished stone value (PSV) or Polished Aggregate Friction Value (PAFV)

TEXTURE DEPTH CONSIDERATION

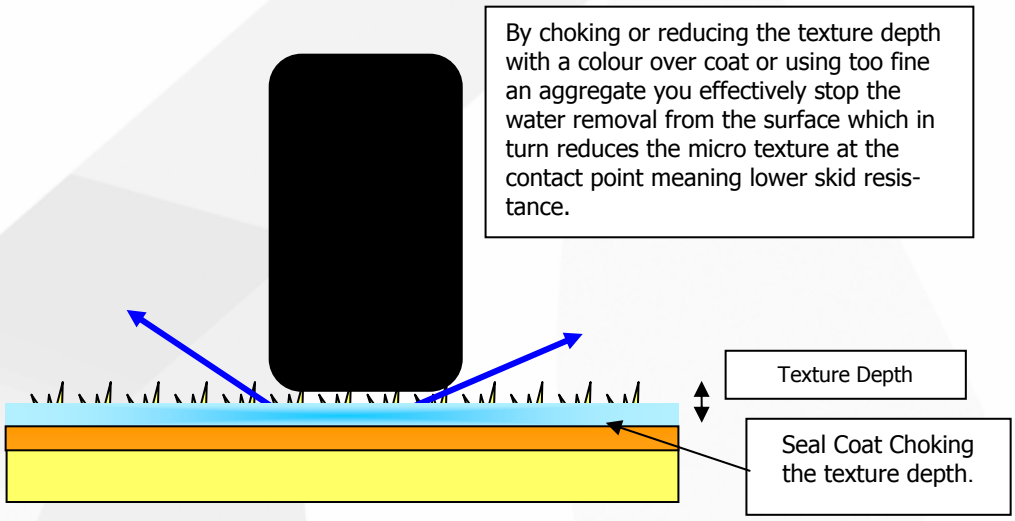


Thus the first point of system design is based on the texture depth and aggregate size.

For vehicle traffic by using a 1 – 3 mm aggregate with a PSV / PAFV greater than 70 such as Calcined Bauxite, the applied system is able to obtain and maintain a design life texture depth of ≥ 1.2 mm when measured by Volumetric Patch Texture Depth in accordance with Austroads SDT 02:2003.

Studies then indicate that this immediately aids the rapid removal of water and increased the contact point between the tyre and the pavement surface and ultimately can effect the braking distances of a vehicle in wet conditions.

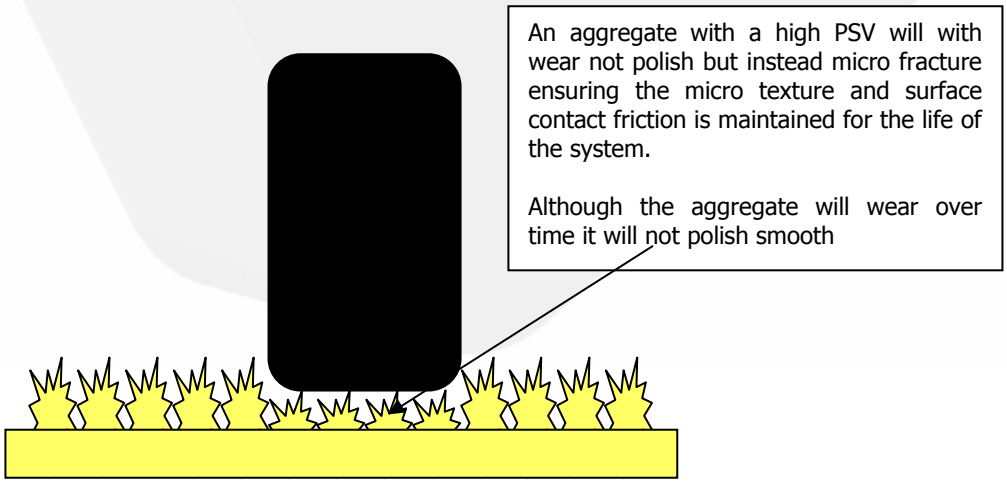
One thing to consider is that many other so termed "anti slip" treatments are reliant on obtaining aggregate retention by placing a coating or sealer over the top of the aggregate which chokes the texture depth resulting in the contact point with the surface being further reduced.



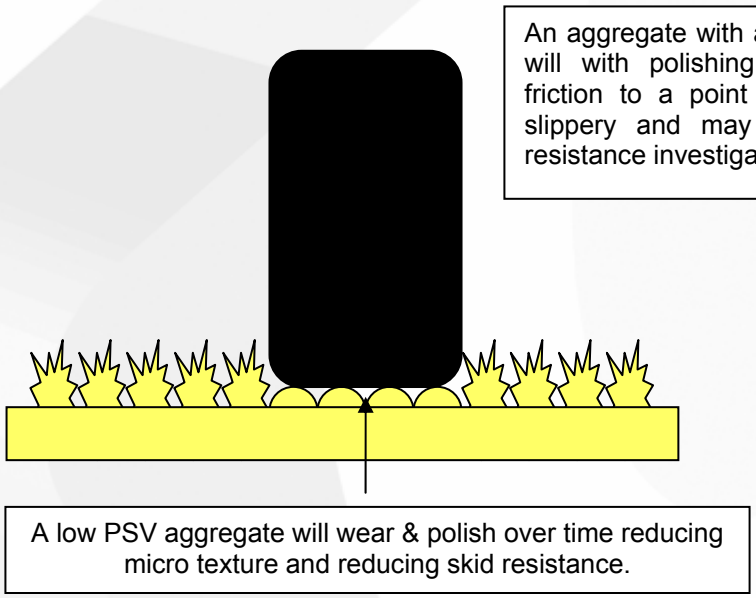
MAINTAINING THE MICRO TEXTURE

The second consideration point in designing a high friction system, and arguably the most important, is that once you obtain a level of skid resistance upon installation you must ensure that the high skid resistance is maintained for the design life of the product

In order to maintain the micro texture we ensure that the aggregate type being used is not only the correct size to give you the texture depth but also the aggregate is not going to polish smooth and become slippery. Thus arguably the most important property of any applied aggregate is to ensure it has a high PSV / PAFV (generally ≥ 70) which will ensure it does not polish smooth but remains sharp for as it wears it micro fractures instead of polishing. Such known aggregates are Chinese Calcined Bauxite, Guyanese Calcined Bauxite and Dynagrip Aluminium Oxide all of which have a PSV /PAFV ≥ 70 and a demonstrated history in the high friction highways industry



HOWEVER in the event that a low PSV aggregate is applied then polishing of the surface under trafficking may rapidly occur rendering the anticipated benefits of the applied treatment null and void.



CERTIFYING PERFORMANCE WITH SIMULATIVE TESTING

Since initial use & trials of the bitumen extended epoxy calcined bauxite highway surfacing in the 1970's and more recently the introduction of STS high friction installations in 1998, high friction surfacing has steadily gained wide acceptance in Australia. Regretfully to date there is no formal Australian Standard for the evaluation of high friction surfacing and experience can only be drawn from the evaluation of local applications and the current British and European Standards which encompass the BBA HAPAS testing regime.

Given that site testing conditions and asphalt designs vary greatly between the UK & Australia site trials and site assessments from the UK can not be considered conclusive. However we are still able to simulate long term performance by utilising the laboratory testing criteria of the BBA HAPAS certification requirements of which there are three fundamental simulative tests that determine the adhesion, wear ability and the long term skid resistance of a system under heavy trafficking.

Primarily these three simulative tests are:

(i) Scuffing – in accordance with the method defined in TRL Report 176: Appendix G.

(ii) Wear – in accordance with the method defined in TRL Report 176: Appendix H.

(iii) Tensile adhesion – in accordance with the method defined in TRL Report 176: Appendix J.

These tests are conducted in accordance with TRL 176 test methods on the material systems and the results provide for varying parameters under simulative heavy vehicle traffic which form the basis for a performance rating classification as TYPE 1, 2 or 3 — TYPE 1 being classified as the higher performing material system.

TRL 176—Simulative Testing

Test [1]		**Parameter**	**Type 1**	**Type 2**	**Type 3**
Scuffing [2]	Initially	Texture depth (mm)	≥ 1.4	≥ 1.2	≥ 1.0
	After 500 wheel-passes	Texture depth (mm) Erosion index	≥ 1.2 ≤ 3	≥ 1.0 ≤ 15	≥ 0.8 ≤ 15
	After heat ageing for 112 days at (70 ± 3)°C and 500 Wheel-passes	Texture depth (mm) Erosion index	≥ 1.2 ≤ 5	≥ 1.0 ≤ 15	≥ 0.8 ≤ 15
Wear	Initially	Texture depth (mm) SRV	≥ 1.4 ≥ 65	≥ 1.2 ≥ 65	≥ 1.0 ≥ 65
	After 100 000 wheel-passes	Texture depth (mm) Erosion index SRV	≥ 1.1 ≤ 3 ≥ 65	≥ 0.9 ≤ 15 ≥ 65	≥ 0.8 ≤ 20 ≥ 65
Tensile Adhesion		Stress at (–10 ± 2)°C ($N\ mm^{-2}$)	≥ 1.0	≥ 1.0	≥ 1.0
		Stress at (20 ± 2)°C ($N\ mm^{-2}$)	≥ 0.5	≥ 0.5	≥ 0.5

1) Tests carried out on asphalt substrates

2) The scuffing test for Type 1 and 2 is carried out at 45°C and for Type 3 at 35°C.

Thus to provide best value and performance the high friction system supplied and installed by STS has been tested in accordance with the TRL 176 simulative testing requirements the results determining that it is a TYPE 1 system as per the above parameters:

ASSESSMENT OF DESIGN LIFE

On the basis of TRL 176 simulative testing depicted below is a table extract from the BBA GUIDELINES DOCUMENT FOR THE ASSESSMENT AND CERTIFICATION OF HIGH-FRICTION SURFACES FOR HIGHWAYS which details the expected life span of 5 – 10 years of an applied 1- 3 mm calcined bauxite high friction surface system dependant upon its Material classification Type.

Site category		Site Definition	Maximum Traffic Levels (Commercial HG Vehicles per lane per day)		
UK Std	Aust Roads Category		Type 1	Type 2	Type 3
F	3	Approaches to and across all major road junctions	3500	1000	250
G1	3	Gradient – 5% to 10% longer than 50 m			
H1	3	Bend – not subject to 40 mph or lower speed limit, radius from 100 m to 250 m			
L	7	Roundabout			
G2	2	Gradient - >10% longer than 50 m	2500	750	175
H2	6	Bend – not subject to 40 mph or lower speed limit, radius < 100 m			
J/K	1	Approach to hazard, such as roundabout, traffic signals, pedestrian crossing, rail level crossing	2500	500	100

In consideration of such testing and classification it has been established that by using a proven TYPE 1 complaint system, such as OMNIGRIP HF, the applied system can provide a life expectancy between 5—10 years under the above specified traffic loading. However when equated to local Australian traffic conditions, which are significantly less than those experienced in the UK, it in fact equates to a design life of 10—15 years subject to the type and volume of traffic.

Thus in conclusion it can be clearly seen that there is a science to obtaining and maintaining high friction & skid resistance. Thus by specifying the material characteristics of OMNIGRIP HF you can be assured that the system will provide the highest performance & best value high friction surface.

For further information please contact:-

OmniCrete Pty Ltd
Phone: +61 3 9469 4498
Email: info@omnicrete.com.au
Web: www.omnicrete.com.au