



Implementation of French asphalt base course technology in eThekweni **GB5®**



RPF Pretoria
19 November 2014

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Much Asphalt's Coedmore asphalt mixing plant



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Implementation of GB5

- Background
- Trials
- Summary
- Next Step

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Background

- Sabita identified EME (*Enrobé à Module Élevé*) as possible viable option for South Africa – 2006
- EME –s French technology developed for highly trafficked roads, airport pavements and container terminals
- Fact finding tour to France & UK May '08 (Reunion '09)
 - Colas, Total, Shell & TRL
- HiMA / EME technology Introduced in SA (Sabita Manual 33)
- CAPSA'11 GB5 technology presented by F Olard
- Much Asphalt obtained License for SA (KZN)
- Mix designs performed at Eiffage Travaux publics laboratory in Lyon



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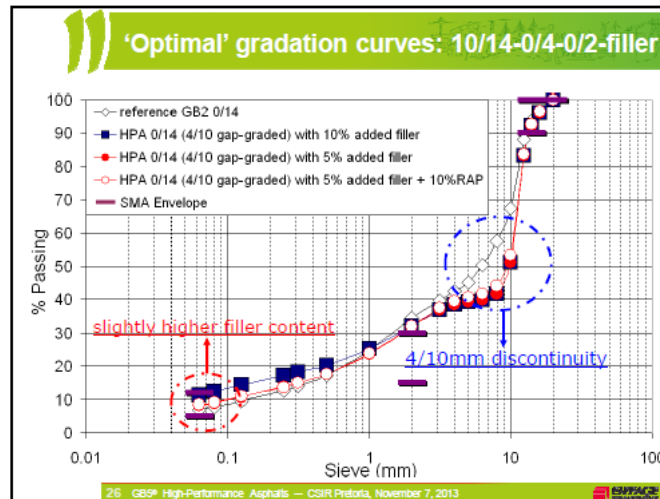
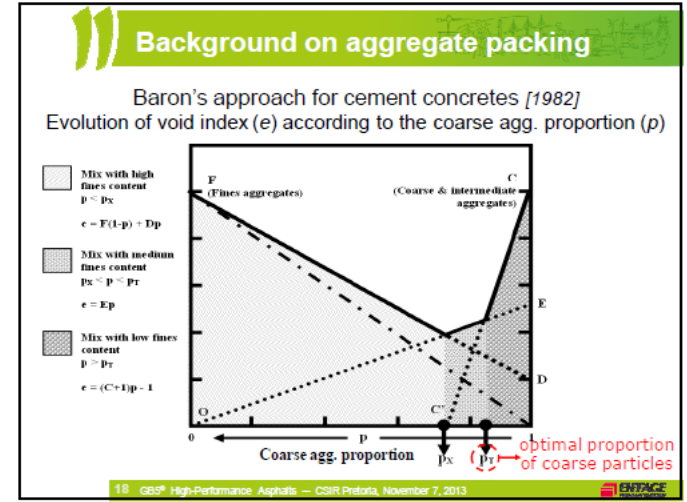
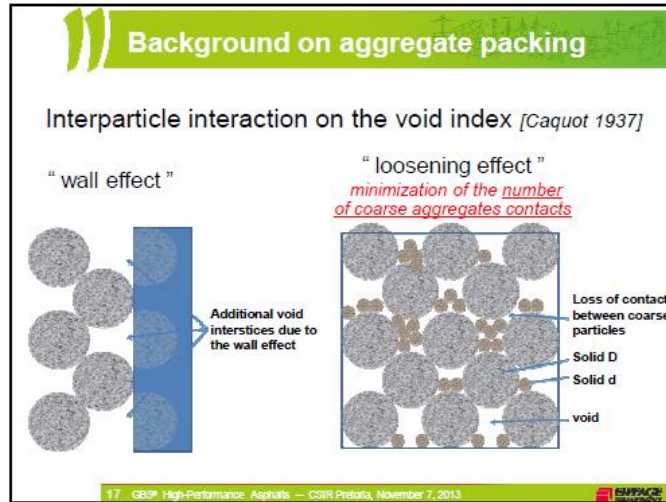
Background 2

- Technology presented at Sabita HiMA workshop 7 November 2013 and eThekweni 8 November 2013
- eThekweni Identified a project where technology can be implemented
- Working Group established to do pavement designs and plan Trials – Similar to implementation of WMA technologies



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What is GB5?



• *Carefully designed aggregate grading – Gap Graded*

• *35/50 with SBS – allows for lower Binder Content than EME*

• *20% RA*

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Trials

- Plant Trials done on Brighton Road on 4 & 7 April 2014
- Paving trial on Project – Solomon Mahlangu Drive on 29 & 30 May 2014
- Testing and evaluation of asphalt (CSIR, SRT etc)
- Full production 3 June – 2 September 2014 (Approx 9500t)
- GB5 Open Day on 10 July 2014
- Paved a reference section with COLTO Coarse A-P1
- Project completed on August 2014 (Approx 9500t)

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GB TRIAL MEETING NOTES

- Site preparation – careful programming
- Traffic accommodation – coping with extremely heavy traffic flows
- Raw materials – managing consistency of aggregates, especially crusher dust
- Manufacture – binder & mix temperature control
- Transportation of the mix
- Paving – monitoring programme

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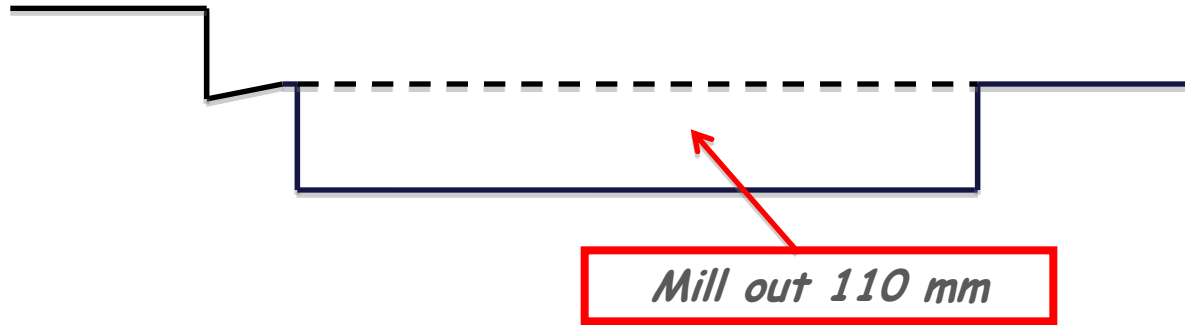
Solomon Mahlangu Drive - existing pavement



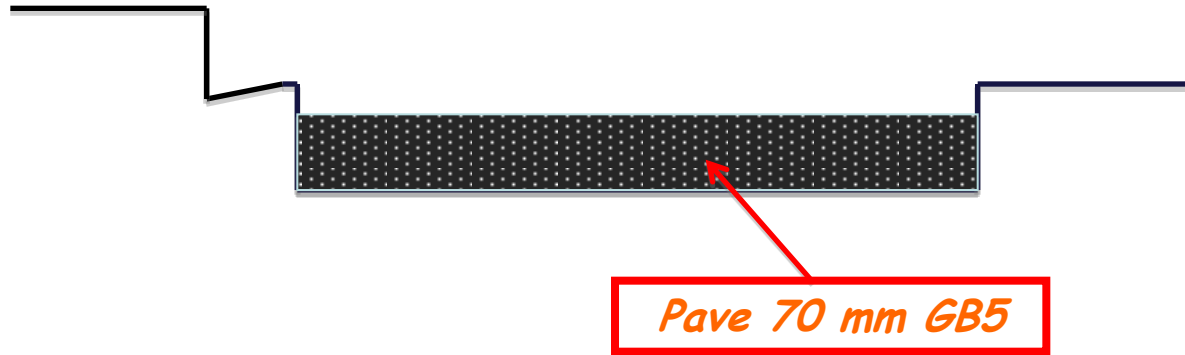
Investigation included test pits and deflection measurements

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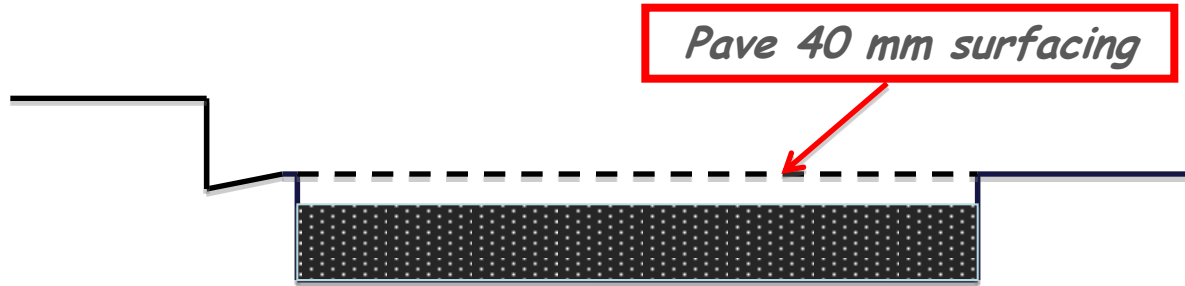




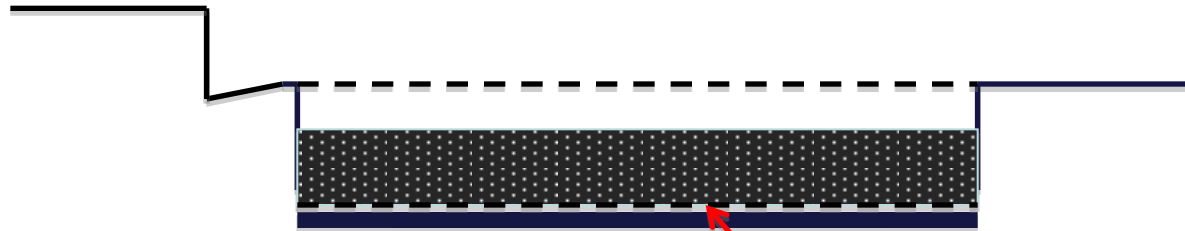
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Install Glas grid in high stress or cracked areas

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Potential to pave base and surfacing together as one layer

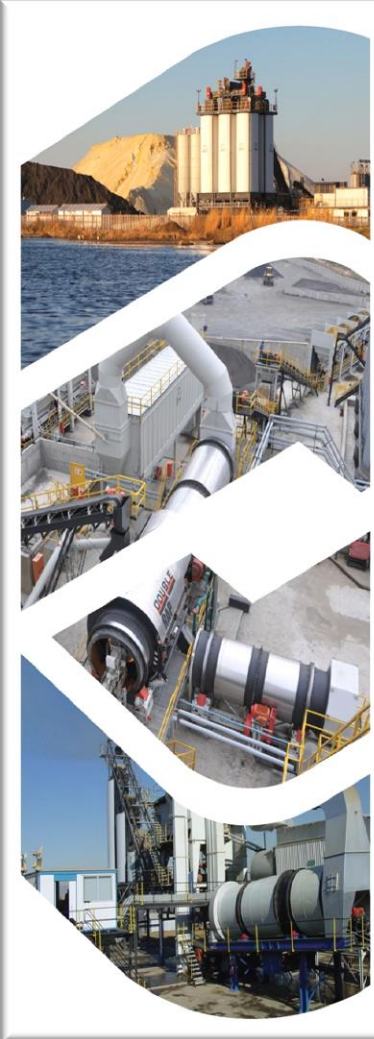
Base & surfacing paved together as one monolithic layer



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T² EME Test Results

Asphalt / Asfalt

					Performance Requirements	
Property	Test	Method	TT EME	GB5	HiMA Base Course	
					Class 1	Class 2
Workability	Gyratory Compactor, Air voids after 45 gyrations	ASTM D6926	5.6%	5.6%	≤ 10%	≤ 6%
Moisture Sensitivity	Modified Lottman	ASTM D4867	0.84	0.92	> 0.8	> 0.8
Permanent Deformation	RSST-CH, 55°C, 5 000reps	AASHTO 320	2.1%	3.0%	≤ 1,1% strain	≤ 1,1% strain
Dynamic Modulus	Dynamic modulus test at 10Hz 15°C	AASHTO TP 62	18.2 Gpa	18.8 Gpa	> 14 GPa	> 14 GPa
Fatigue	Beam fatigue test at 10 Hz 10°C, to 50% stiffness reduction	AASHTO TP 321	272 µ€	250 µ€	> 10 ⁶ reps @ 330µ€	> 10 ⁶ reps @ 390µ€

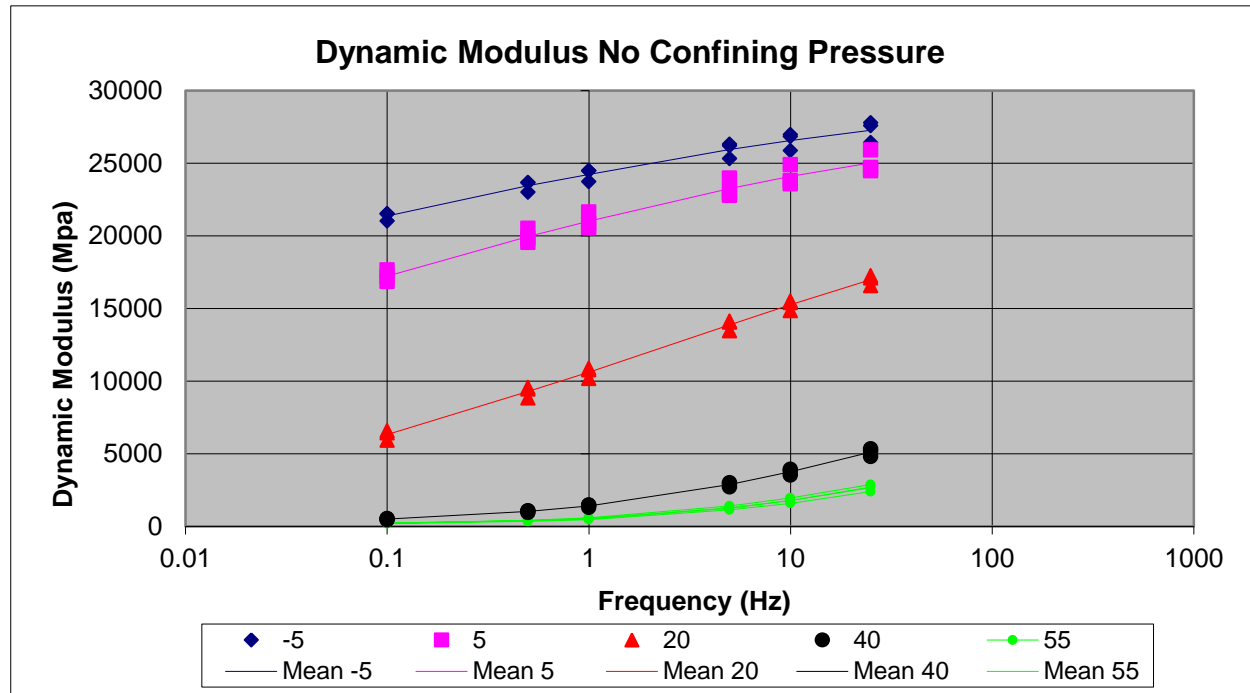
Typical test results



Test parameters	Typical Results	Standard deviation
19	100	
13.2	99	0.87
9.5	66	1.62
6.7	49	1.37
4.75	42	1.01
2.36	30	0.86
1.18	22	0.75
0.600	17	0.49
0.300	14	0.33
0.150	11	0.49
0.075	8.1	0.23
Binder content %	5.0	0.09
Film thickness (microns)		
Voids %	3.9	
Gyratory void content (45 revs)	7.9	
Indirect tensile strength (kPa)	1340	
Core Density	97	

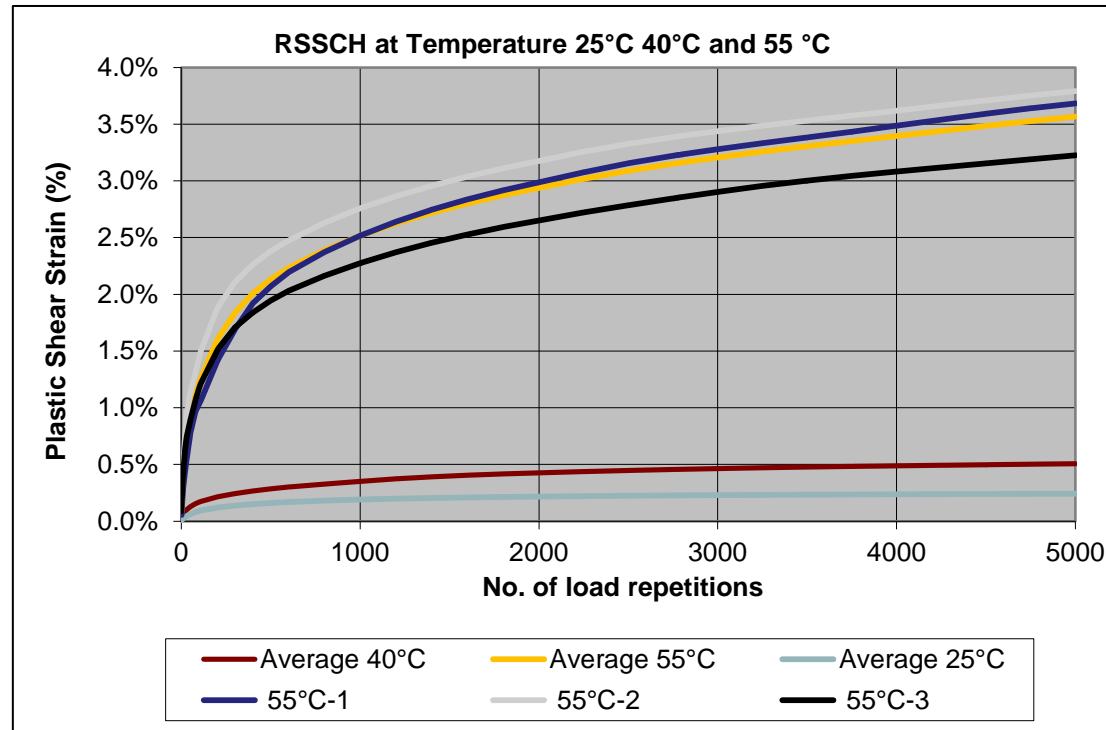
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Dynamic modulus (stiffness)



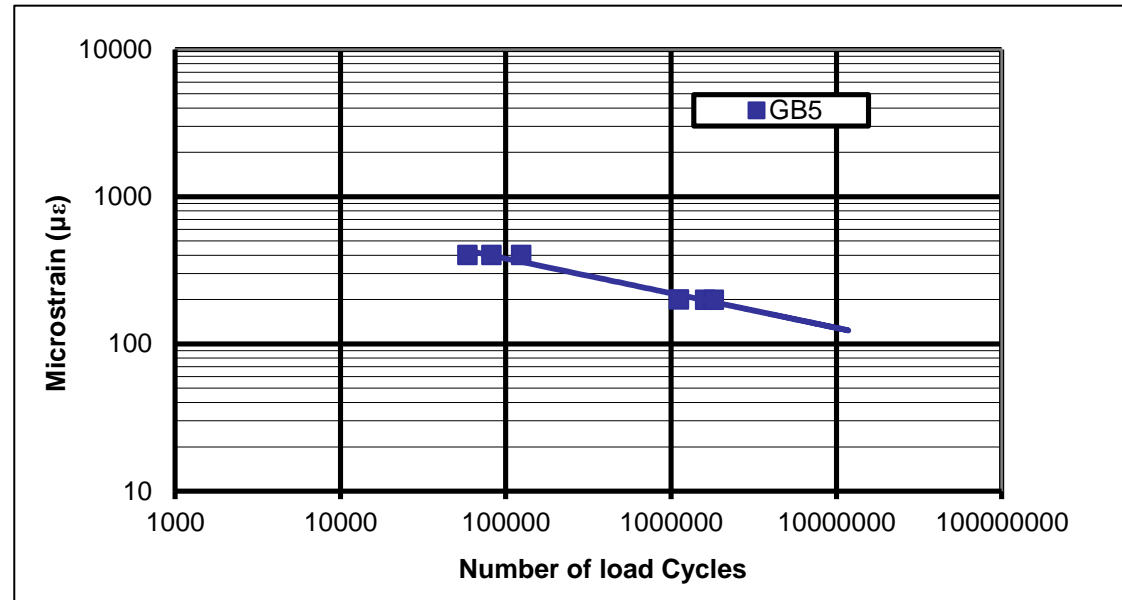
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Permanent deformation: Repeated Simple Shear Test at constant height (RSST -CH)



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Beam fatigue



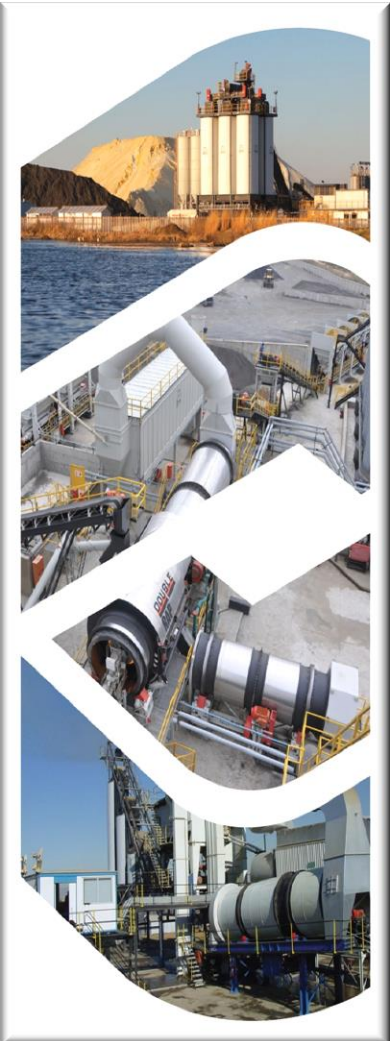
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SUMMARY

- **9 494 tons of GB5 has been successfully manufactured and paved on Solomon Mahlangu Drive**
 - **Much Asphalt's Coedmore plant is fully capable of manufacturing the mix within the required tight limits**
- **Aqua is succeeding in the onerous task of accommodating the traffic as well as paving, compacting, and monitoring the GB5**
 - **eThekwini's rehabilitation team has been actively assisting throughout the trial**

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SUMMARY

Benefits:

- Utilises reclaimed asphalt
- Low permeability
- Texture – promising use in a monolithic layer, as base-cum-surfacing
- Straightforward compaction lends itself to good riding quality
- Uses locally available binder
- High stiffness with good fatigue and rut resistance properties enhances its use on our more highly trafficked

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Next Step

- Agrément Certification
- Offered as alternative to EME



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Thank you for your attention

