WORLD ROAD ASSOCIATION MONDIALE DE LA ROUTE
Norfolk, Virginia / September 19-22, 2012
7th symposium on pavement surface characteristics
SURF 2012

SIMULATIVE POLISHING IN THE LABORATORY

Alan Dunford, Helen Viner, Peter Roe (TRL)
Louise Caudwell (Highways Agency)

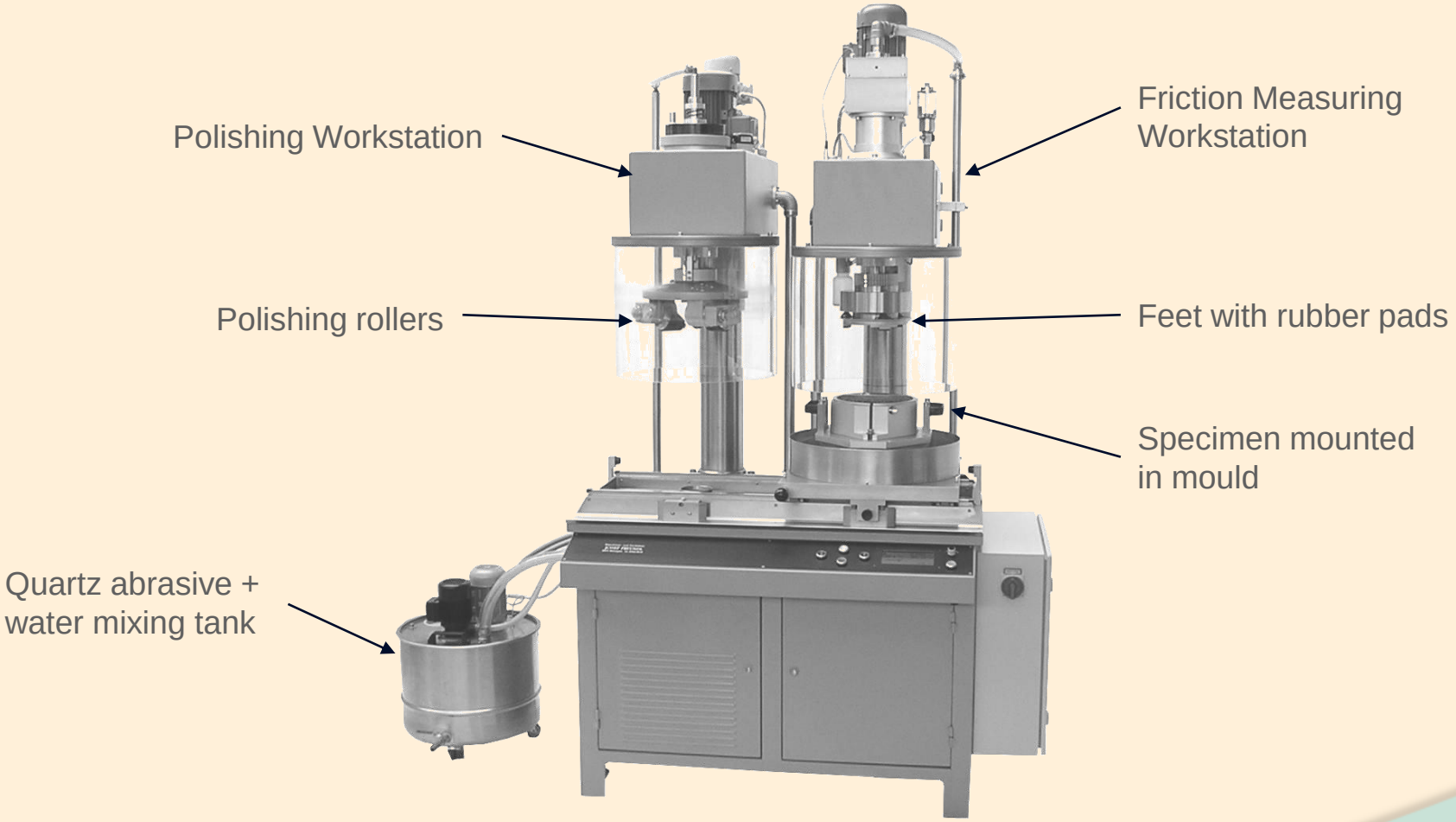
Contents

- Overview
- Description of Wehner-Schulze machine
- Assessment of polishing cf. traffic
- Skid resistance of blended aggregate
- Conclusions

Overview

- Specification for aggregates used in surface course uses PSV to ensure minimum standard for polish resistance
- Useful tool but with a number of limitations
- UK programme to evaluate Wehner-Schultz machine
  - Can it compliment or replace PSV test?
  - Final part of this programme reported here following field trial
- W-S device used to investigate effect of blending different sources of aggregate
  - Sources of highly polish-resistant aggregates are limited
  - Skid resistance on UK motorways exceeds current requirements!

Wehner-Schulze machine



Wehner-Schulze machine

Field trial

- Compares effect of accelerated polishing in W-S machine with that of traffic
- Asphalt mixtures prepared in laboratory to UK SMA specification
- 225mm cores
  - Embedded in trial sites
  - Polished in laboratory
  - Subject to weathering

Field trial

- TRL pavement test facility used to test method of embedding core samples

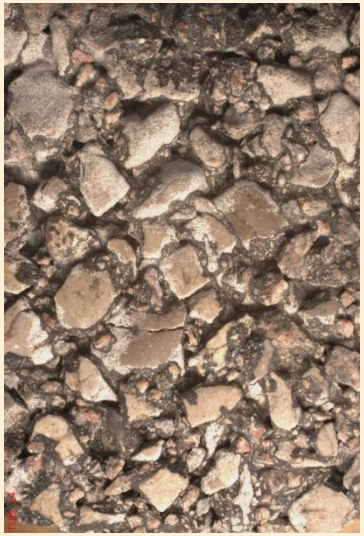
Sample composition

ID	Coarse aggregate	Coarse aggregate type	Nominal PSV of coarse aggregate	Fine aggregate
1	A	Felsite	59	L
2	B	Porphry	60	B
3	B	Porphry	60	L
4	C	Gritstone	65	C
5	D	Granite	57	L
6	E	Basalt	55	L
7	F	Gravel	-	L
8	G	Dolerite	65	L
9	H	Gritstone	68	L
10	C	Gritstone	65	L
11	J	Dolerite	62	L
12	K	Granite	52	L
13	L	Granite	53	L
14	M	Limestone	36	L

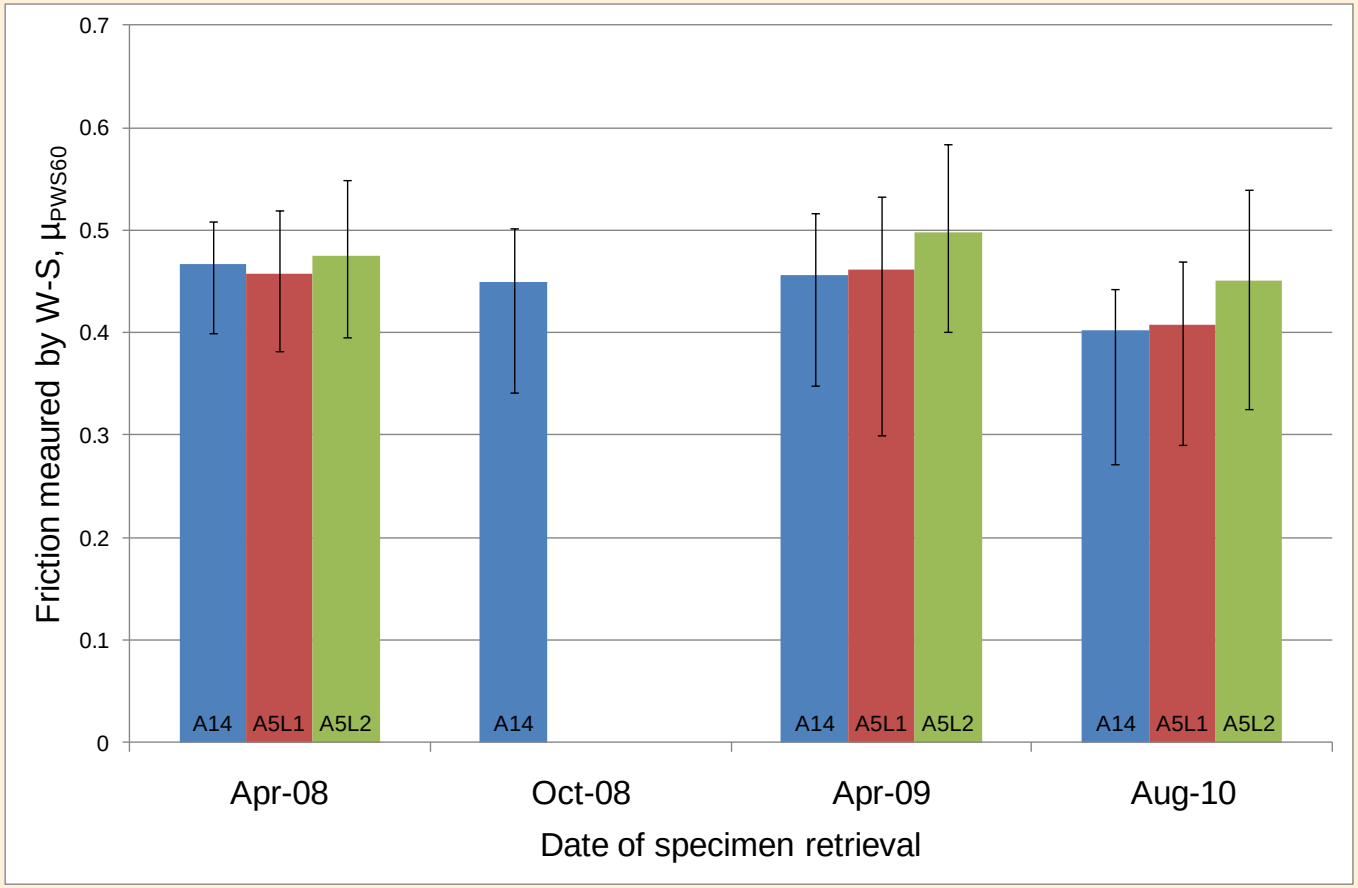
- 14 mix designs
- 12 coarse aggregates
- 3 traffic levels
  - 200 CVD
  - 1200 CVD
  - 4500 CVD
- 4 specimens from each mix
- Retrieved at intervals up to 3 years traffic

Visual assessment of polishing

Traffic level:

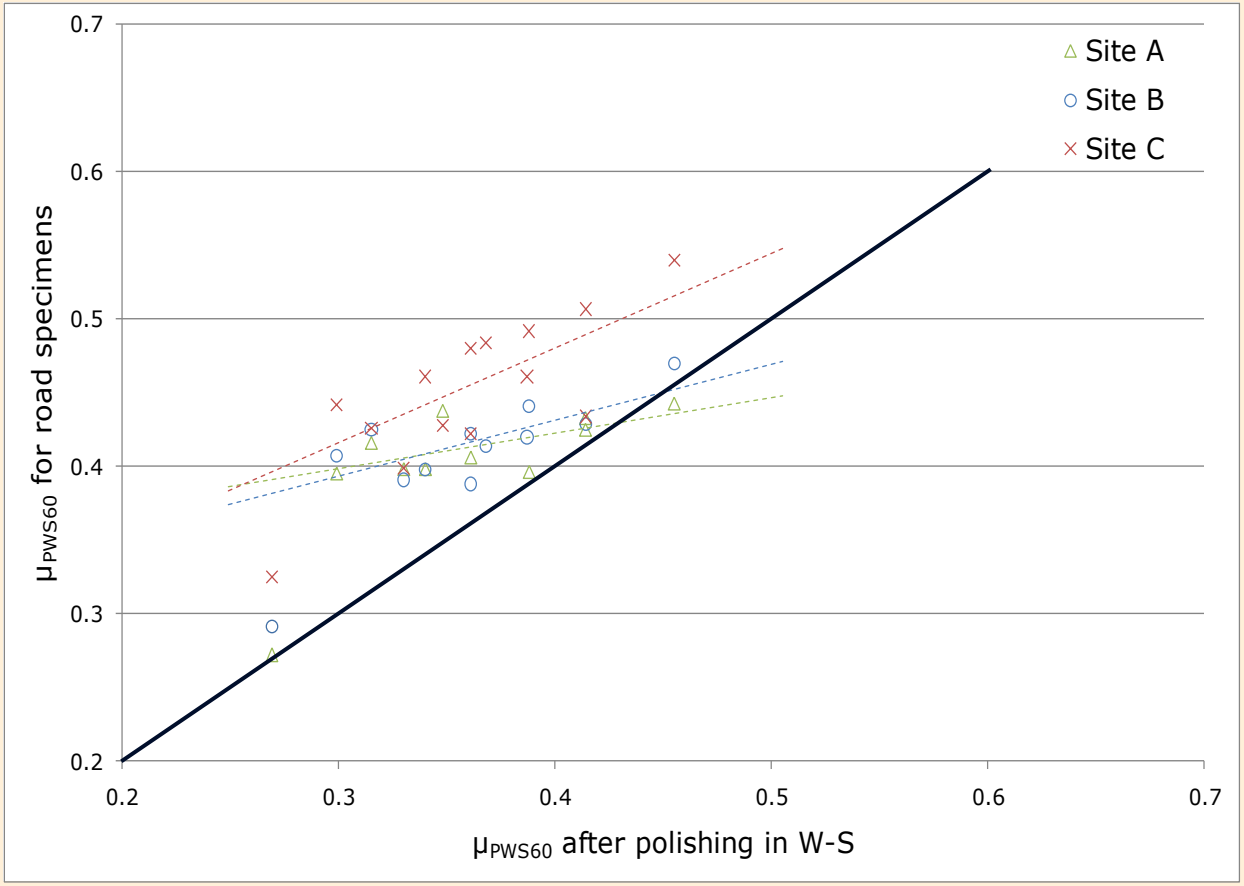
	High	Medium	Low	
TUB method					LCPC method 

Friction results for samples retrieved from trial sites



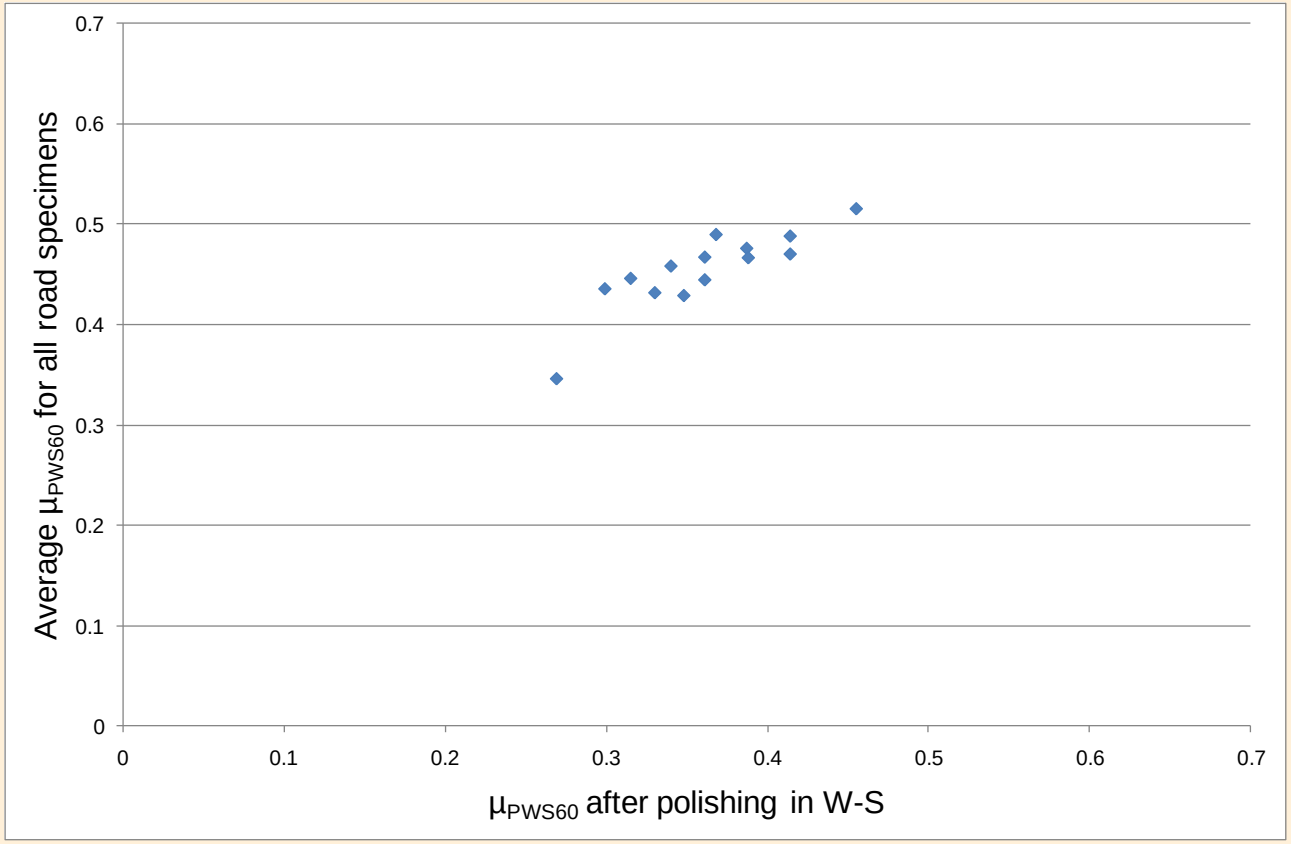
Friction results

Road specimens compared with W-S specimens



Friction results

Road specimens compared with W-S specimens

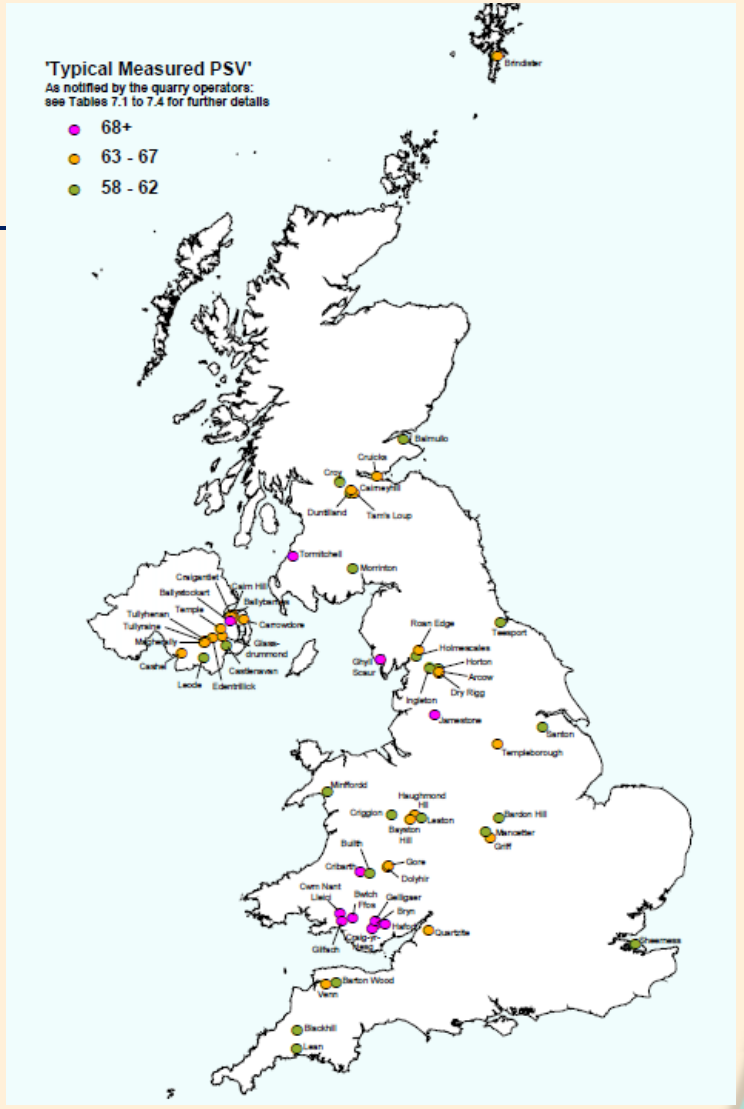


Comparing polishing

- Demonstrated correlation between traffic and machine polishing
- Asphalt that performs poorly in the machine will perform poorly in the road
- Only compared non-event sections
- Machine applies a controlled ‘amount’ of polishing rather than simulating polishing by traffic

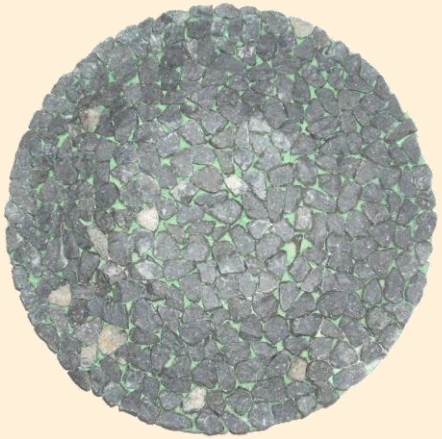
Blended aggregates

- Limited stocks of polish resistant aggregate
- Aggregate hauled from limited number of quarries
- Trunk road network over-performing
- Require a mechanism for use of low PSV aggregate
- Lab experiments to investigate skid resistance performance

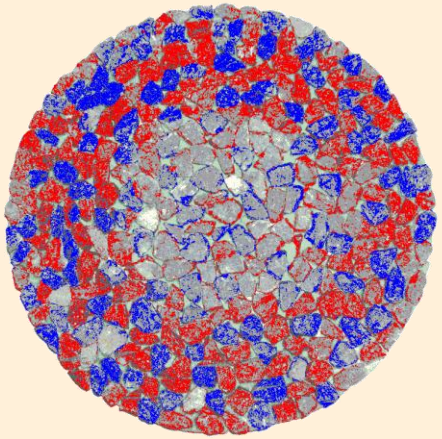


Blended aggregates

e.g. μ = a

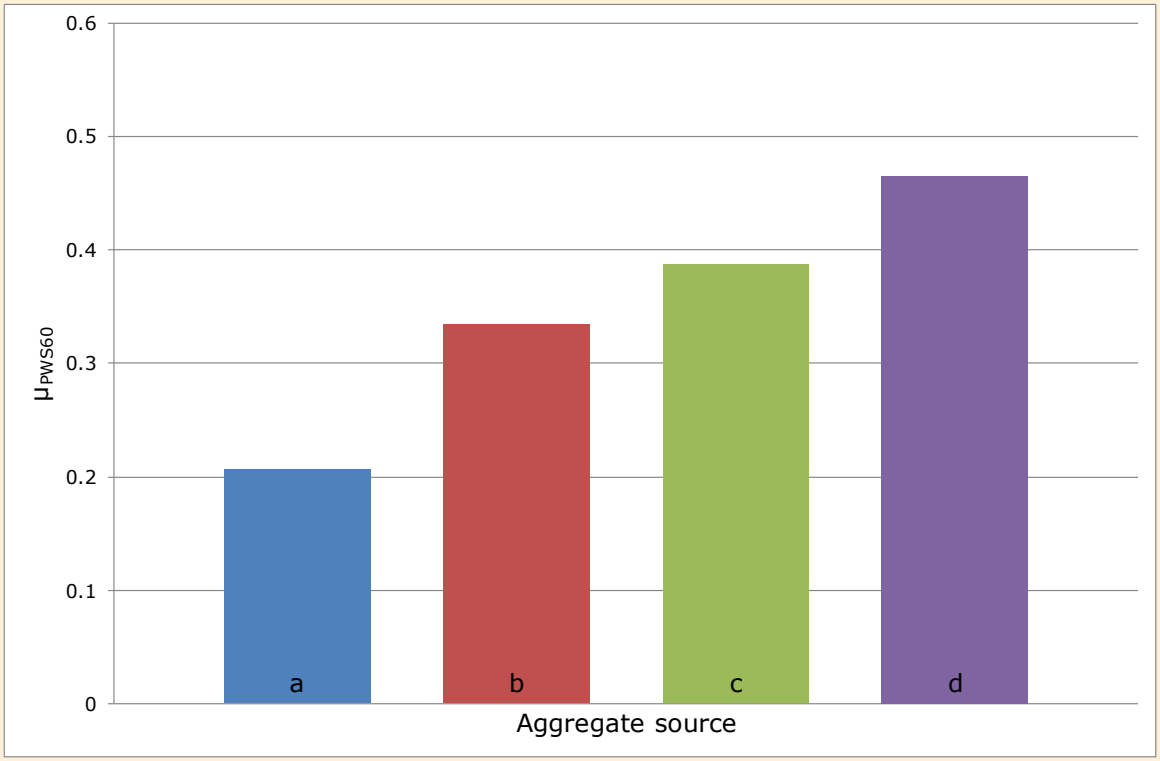


e.g. μ = b

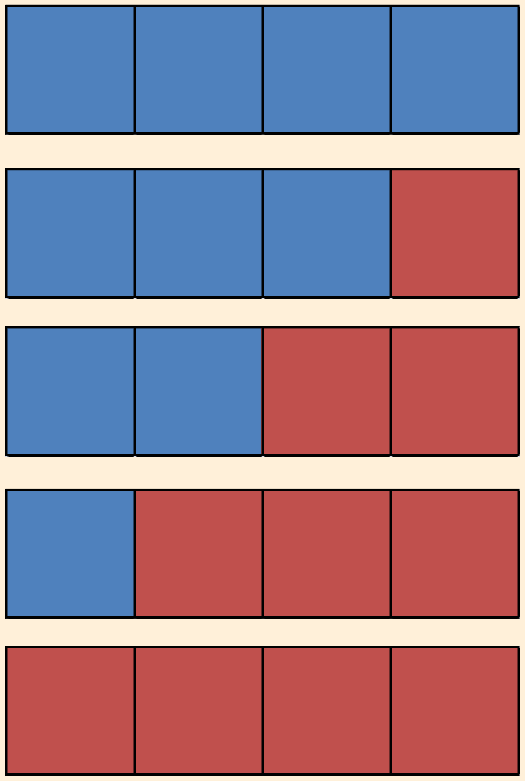


μ = a/2 + b/2 ?

Friction results for individual aggregate sources



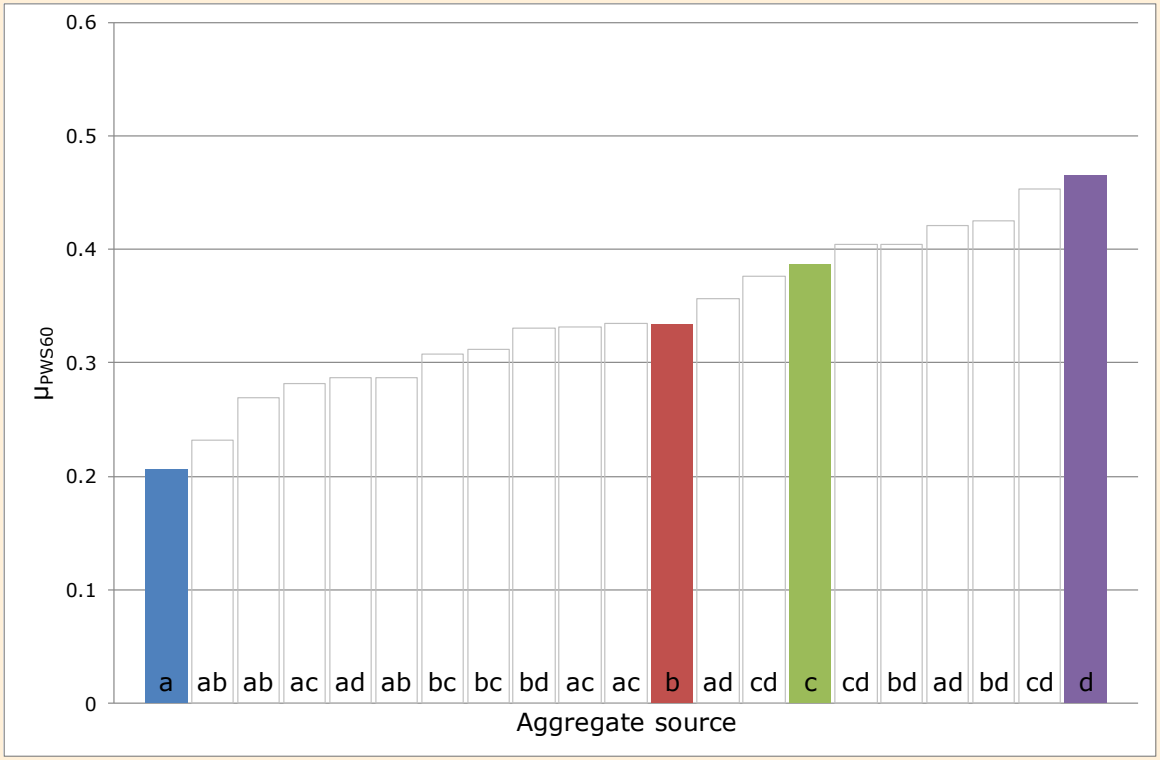
Blended aggregates



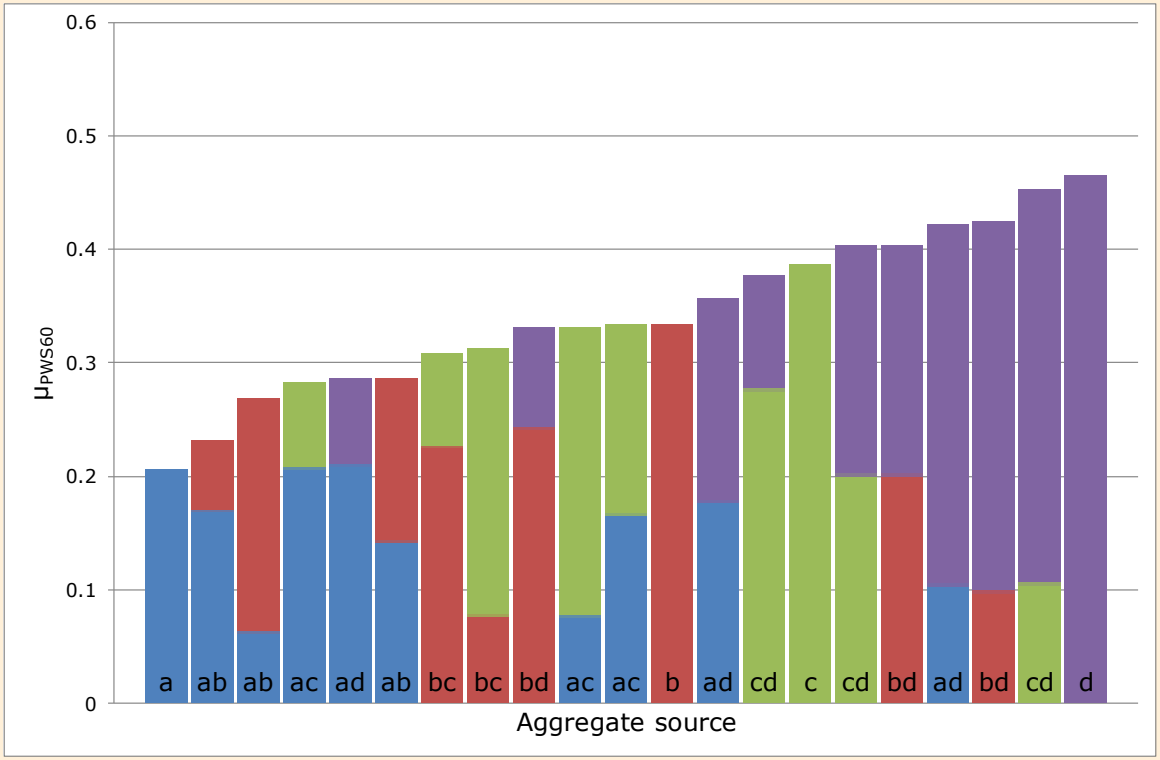
Combinations of two aggregates by mass:

- 100 %
- 75 / 25 %
- 50 / 50 %
- 25 / 75 %
- 100 %

Blended aggregates



Blended aggregates

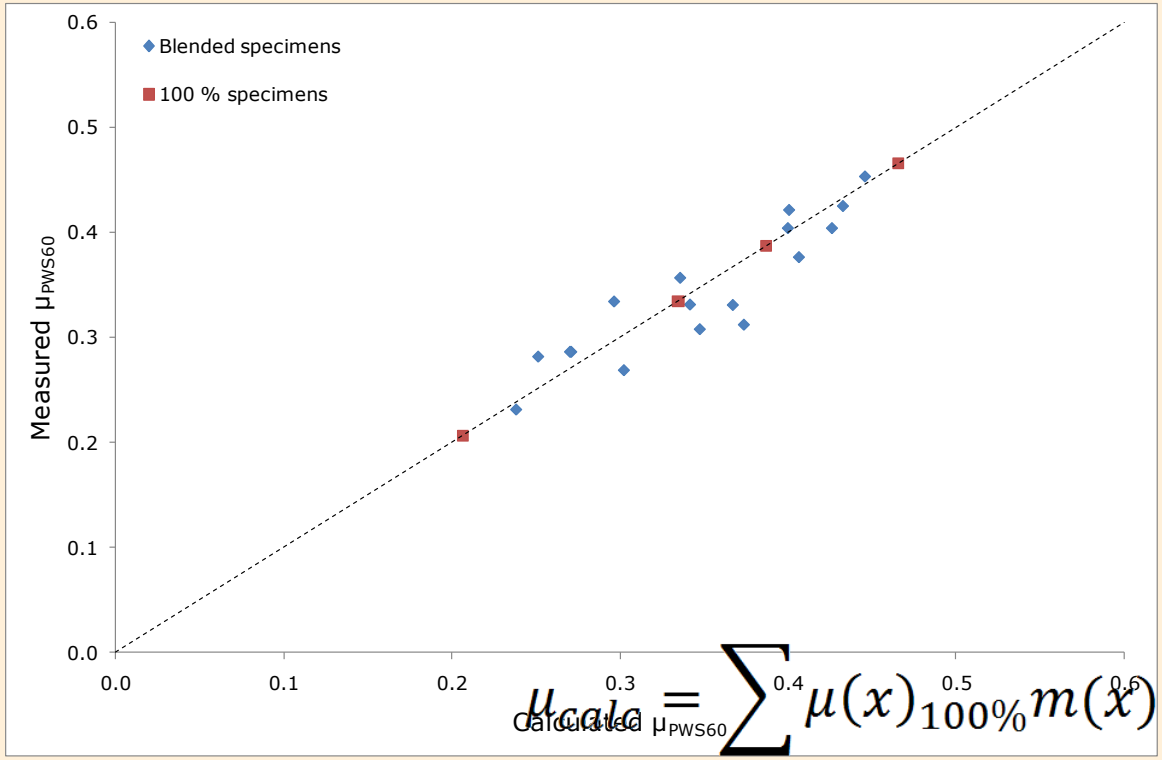


Blended aggregates

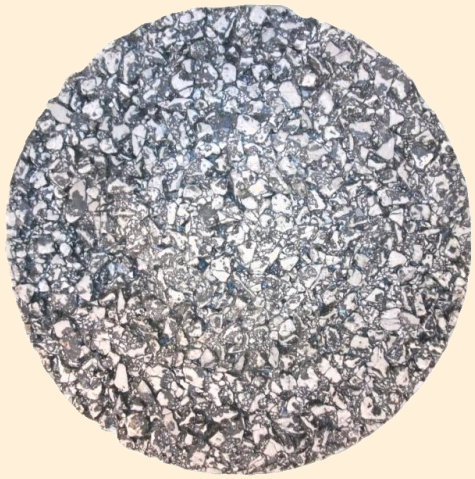
- Calculate an expected friction for blended specimens
  - Based on measurements of μ on 100% specimens
- Weighted depending on mass of each constituent
- Compare with actual measurements

$$\mu_{calc} = \sum \mu(x)_{100\%} m(x)$$

Blended aggregates



Blended aggregates

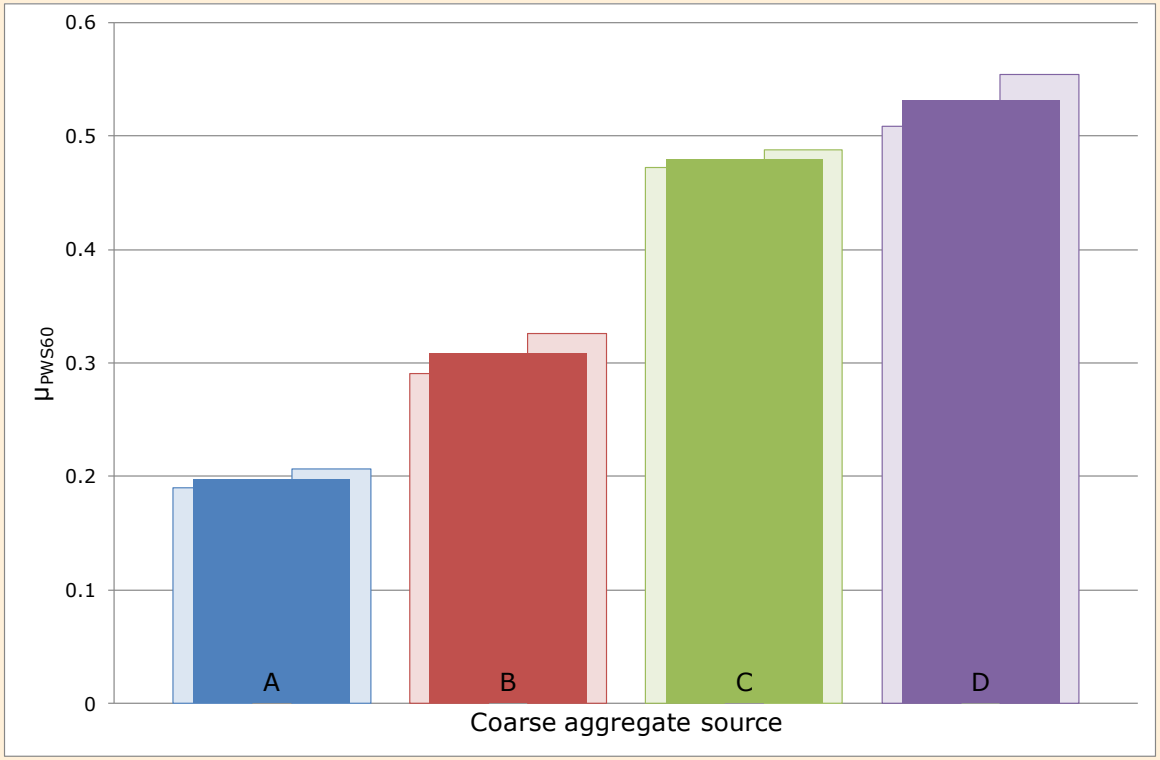


μ = a

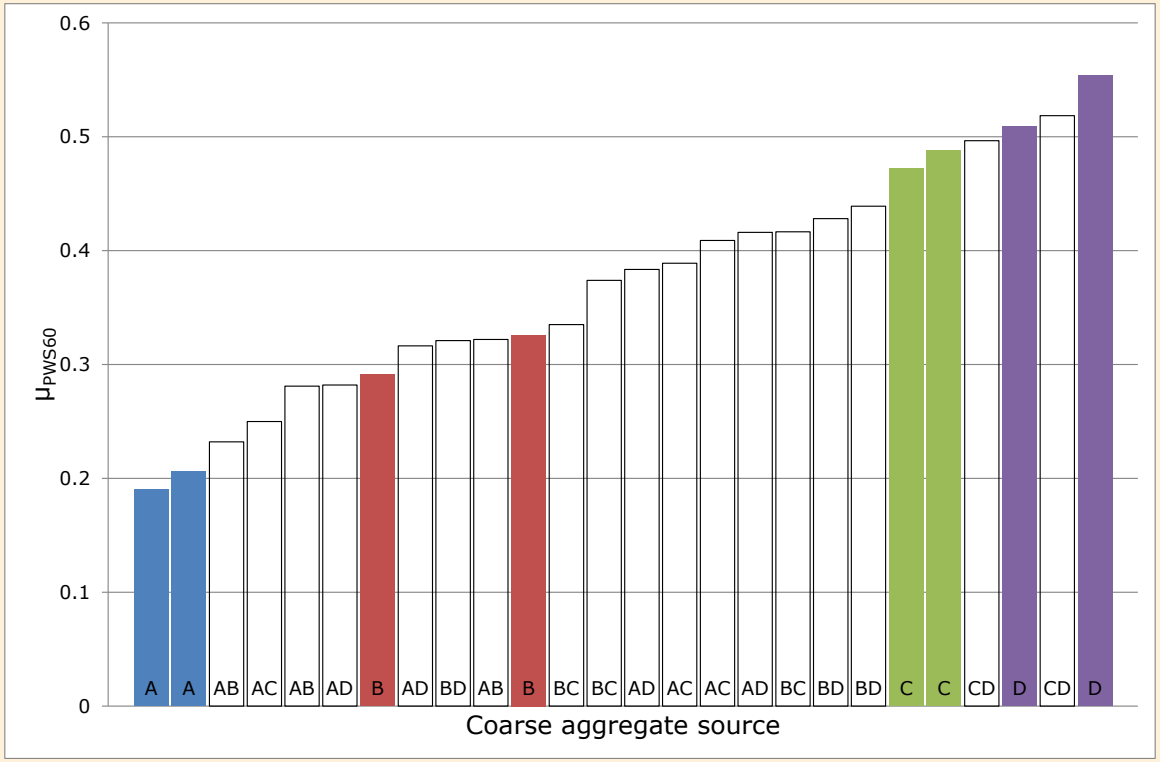
μ = c

μ = a/2 + c/2 ?

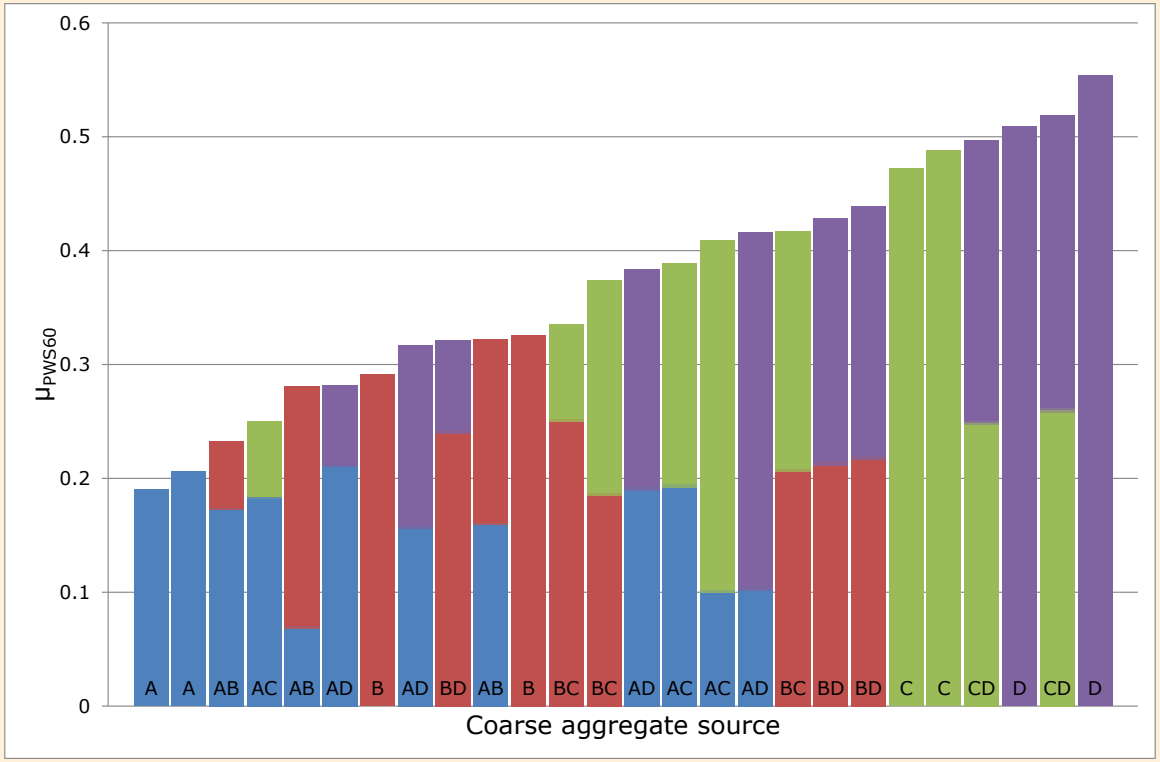
Blended aggregates



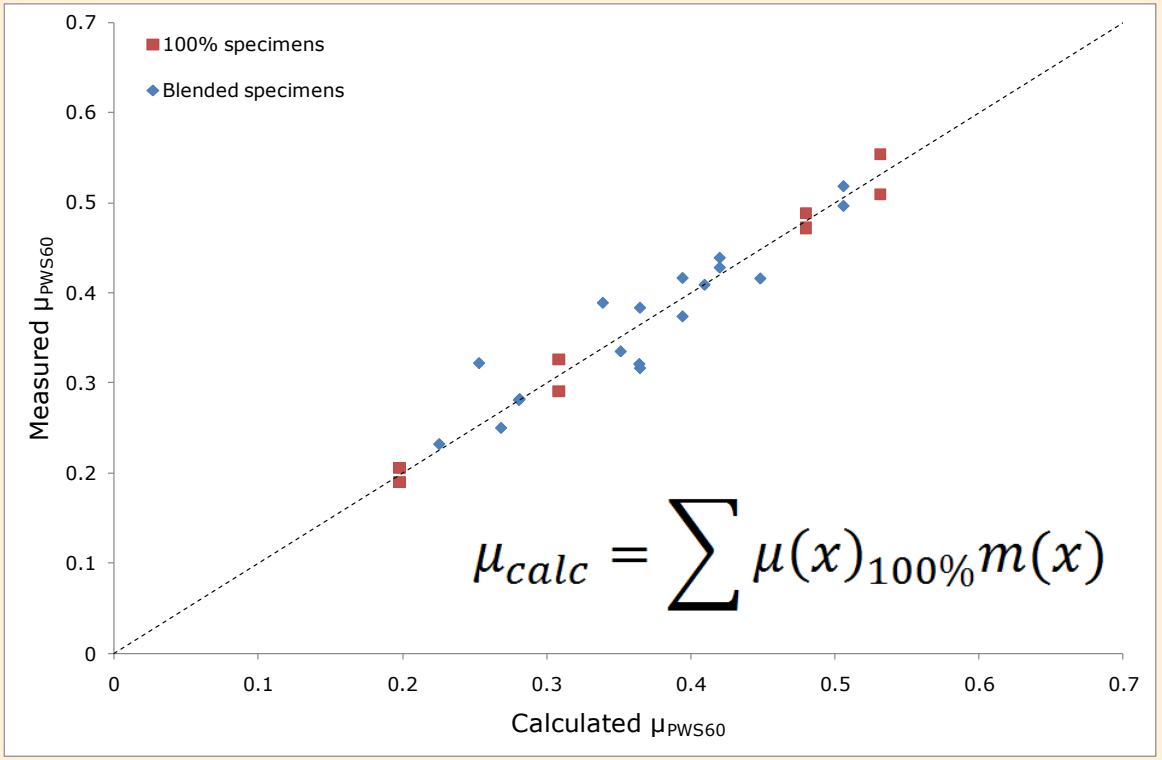
Blended aggregates



Blended aggregates



Blended aggregates



Conclusions

- Wehner-Schulze machine can be used to determine likely performance of asphalt when used in the surface course

- Aggregates can be blended with reasonably predictable results

WORLD ROAD ASSOCIATION MONDIALE DE LA ROUTE
Norfolk, Virginia / September 19-22, 2012
7th symposium on pavement surface characteristics
SURF 2012

SIMULATIVE POLISHING IN THE LABORATORY

Alan Dunford, Helen Viner, Peter Roe (TRL)
Louise Caudwell (Highways Agency)