

Characterization of WMA

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Topics Discussed

- Aging
- Fatigue
- Rutting
- Moisture Damage
- Recyclability

Aging

- Extraction – Abson procedure
 - Possible contamination and damage during the process
 - Good binder recovery method needed
- Depends on the plant type
- Mixture aging:
 - Spain method (UCL) – Not an aging method, but testing cohesion
 - AASHTO R30 – Oven aging
 - WRI coring and 4 mm plate DSR
 - Lab to field correlation needed
- Reproduction of plant WMA in the lab is difficult
 - Particularly a problem with foamed WMA
 - Laboratory scale foaming machine (Wirtgen, German)
- Rate of long term aging from different initial aging conditions may be different.

Fatigue

- Test methods used in Brazil
 - Indirect tensile test developed in Brazil
 - Beam fatigue test
 - Trapezoidal fatigue test
 - APT
- Correlations between the laboratory and the field are poor.
- Insignificant difference between WMA and HMA, if %AV is similar (both laboratory and APT)
- Why do we not see the difference in fatigue when there is a large difference in initial aging conditions between HMA and WMA? Are the existing tests too insensitive? Use of lime in WMA, but not in HMA? Difference in %AV? – Need a well controlled experimental program to sort out effects of various factors. Need to include healing (important!).
- Use the VECD method in direct tension mode – efficient (i.e., less testing requirement and more sensitive)

Rutting

- Test Method
 - French Rut Tester
 - Flow Number test (static and dynamic)
 - CDI and TDI from gyratory compactor
 - VEPCD model with triaxial creep and recovery test
- APT results from Ohio ALF (8 km/hr) and California HVS (12 km/hr) suggest no significant difference between HMA and WMA, but more initial rutting from WMA (probably due to larger air voids in WMA).

Moisture Damage

- Laboratory Observation: More severe moisture damage from WMA
 - DURIEZ method (France, compression after 18C)
 - AASHTO T283
 - Cantabro method
- How to fabricate lab samples is an issue.
- More problem with absorbant Basalt aggregate
- Use lime for WMA
- Liquid anti-stripping agent is not effective.
- Need a better test method

Recyclability

- Different aging may need a different RAP mix design method.
- RAP plus WMA? Compromise in workability and aging may allow higher RAP contents.
- Use of WMA technologies in recycling of modified mixtures