

Summary of Testing Capability Nottingham Centre for Pavement Engineering (NCPE) University of Nottingham



General comments on testing capability

- UKAS quality accreditation achieved July 2004 (Testing Laboratory 2618).
- Most testing carried out routinely but some will require special configurations.
- Bituminous product preparation and characterisation eg fluxed bitumen, bitumen blends, PMB, bitumen/additive blends by high shear mixing, and foamed bitumen.
- Mix preparation and characterisation according to BS, BBA, EN, ASTM and in-house methods.
- Acceptance of work subject to satisfactory HSE assessment.
- Interpretation of results (where requested), analytical expertise, mix design and modelling.
- Links with extensive concrete, infrastructure, geomechanics, engineering and space surveying and geodesy technology elsewhere in School.
- Extensive access to multi-disciplinary capability in other Schools of the University.

Mechanical response of materials induced by traffic or thermal variations

- Binder testing by standard and complex methods (ie BS, IP, EN, ASTM and AASHTO) rheology by DSR, DT and BBR. Binders tested neat, post-RTFOT, post-TFOT, or post-PAV (HiPAT). Only UK lab to be UKAS accredited for DSR of binders.
- Vialit cohesion and force ductility of binders
- Mix response by Nottingham Asphalt Testing Apparatus (NAT) and measurement of complex modulus (for viscoelastic rheology) by servo hydraulic compression / tension load frames with temperature control.
- Mix response by in-house thermal cracking test.
- Triaxial testing for aggregate component and mixtures.



Permanent deformation (at high temperatures) and fatigue (at low temperatures)



- Binder rheology as above.
- High temperature mix response by repeated loading (NAT RLAT), triaxial testing and simulated confinement by VacRLAT.
- Small and large wheel tracking testers BS, EN.



- Slab Test Facility (STF) and Pavement Test Facility (PTF)
- Repeated tensile and/or compressive loading (NAT ITFT).
- 2-point trapezoidal beam fatigue apparatus (EN) and 4-point beam rig with associated servo hydraulic compression / tension apparatus and temperature control.

Ageing of binders and mixes, and sensitivity of mixes to water and the environment

- Binder ageing in air by oven, RTFOT, TFOT and PAV (HiPAT) by standard methods or by variation of temperature/time/air flow or pressure.
- Preparation of leached eluates.
- Spot-test for presence of tar in asphalt samples.
- Mix ageing to air by oven ageing, susceptibility to water by extended tank immersion, thermal extremes by AASHTO 283 (mod Lottman) and air/water accelerated ageing by new UK SATS method and traditional LINK Bitutest.
- Binder recovery after ageing and evaluation by standard methods or by rheological methods and FTIR spectroscopy.

Risks of delamination in multi-layered structures



- Preparation of multi-layer samples with customised interfaces
- Flexural tests using servohydraulic compression / tension with temperature control.
- Torque and Leutner tests for bond strength.
- Shear and tensile bond testing to DMRB HD 47/99 and in-house methods.

Skid resistance, risks of ravelling, stripping, wear of skid resistance

- Potential for in-house friction measurement.
- Pendulum friction tester.
- Water immersion wheel tracking.
- Scuffing resistance using inclined wheel in wheel tracking apparatus (potential for local test method development for ravelling etc).
- Contact angle measurement for binder/aggregate wetting potentially available in University.

Resistance to chemical spills (oil, fuel, de-icing agents)

- Mix response to diesel, de-icing fluids and other chemicals monitored by mass loss, NAT ITSM (EN and in-house), scuffing tests or other mechanical properties as required.