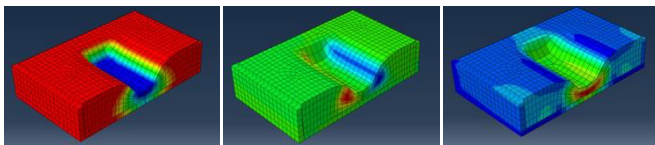




## Testing shear properties of asphalt mixtures

One of the criteria in pavement designs in developed countries is an assessment of asphalt mixture resistance to permanent deformations. The occurrence of permanent deformations has a significant impact on serviceability, surface water runoff, ride comfort and, last but not least, road safety. Shear properties of asphalt compacted layers as pavement design parameter have been described and used in number of research projects. The Repeated Shear Test at Constant Height was proved as a suitable test to predict the rutting performance of asphalt mixtures run in accordance with AASHTO T 320-07 2011.

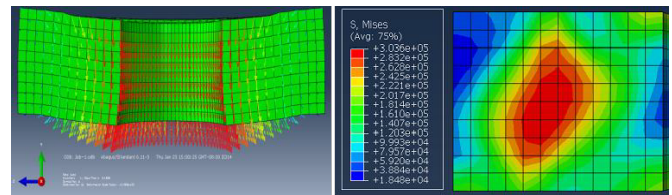


Wheel Tracking Test Simulation

The lack of devices to measure shear properties of asphalt layers was the reason for research and development of the new type of apparatus. SHEAR1 is characterised by low production and operating costs, due to its efficient and simple design. SHEAR1 uses UTM, as a device applicable to a different variety of laboratory tests. The SHEAR1 measurement results correlate with the Superpave Shear Tester (SST) according to AASHTO T 320-07.

### Loading Principle

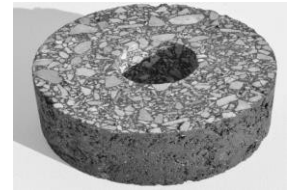
The piston transfers the load to the steel ring with a liner. The liner is pushed vertically through the sample, which typically has a temperature of 50°C - 60°C. This produces a shear stress and a deformation in the tested asphalt mixture sample. The steel cylinder restricts the asphalt mixture horizontal strain at the lateral area. The load applied can be static, dynamic or in cyclic pulses.



Shear stress and a deformation simulation by SHEAR1

To guarantee standard requirements for planarity, parallelity and perpendicularity of the test specimens, the following parameters shall be followed:

- The dimensions of the specimen are 150mm diameter and typically height of 50mm
- The diameter shall not differ by more than 0.1 mm and the height by more than 2.0mm
- The cylindrical opening at the centre of the specimen shall be made by standard laboratory coring equipment  $50 \pm 0.5$ mm in diameter



The test may be carried out on test samples prepared as followed (maximum 22mm grain size):

- samples prepared in the laboratory by Gyratory compactor
- samples taken by coring equipment from a laboratory-prepared slab of asphalt mixture
- units prepared from a core samples from pavement
- samples prepared in a laboratory with an impact compactor

### Output measurement parameters

- shear modulus
- the number of cycles to achieve a specific level of permanent strain
- permanent deformation on defined load cycles
- permanent deformation increment
- complex shear modulus, and more

These parameters can be used to design pavement structures or new materials.

### SHEAR1

The SHEAR1 device consists of:

- steel cylindrical mould
- steel ring with liner
- steel distance ring
- support and mounting for LVDTs (Linear Variable Differential Transformers) sensors arranged evenly at an angle of 120° (with lock option).

The UST test assembly is axisymmetric along the vertical axis. The entire test set is inserted into a UTM (NAT) device that incorporates a servo-hydraulic or pneumatic load device (min. force 2000 N with accuracy  $\pm 5\%$ ). In addition, the system shall be equipped with three deflection sensors (complying with a 0.2 accuracy class with a range  $\geq 10$  mm) and control & measurement system consisting of a computer and a software for data acquisition, reading, and control.

