***Fatigue Resistance Testing of Different Pavement Surfaces Mixes in Laboratory Conditions***

Not many countries are using the combination of thin asphalt surfaces on bound or unbound granular bases. However, thick or full-depth asphalt pavements in smaller economies may be unaffordable, making thin asphalt surface a viable option. Given the flexibility of granular base course layers, the life expectancy of the thin asphalt layer is reduced because of increased fatigue movement. This research investigates the specific application of thin asphalt surfaces typically constructed on bound and unbound granular layers. It also investigates the application of Cape Seal layers on thin asphalt surfaces. The research aimed to compare the following:

* Performance of fibre-reinforced asphalt with traditional asphalt mixes.
* The fatigue resistance of asphalt without Cape Seal and asphalt with Cape Seal.
* The performance of Cape Seal with and without fibres.

This research has also considered whether the fatigue resistance test sample dimension needs to reflect the thickness of thin asphalt surfaces. Four-point bending beam fatigue test was used to evaluate the fatigue resistance of test beams of different dimensions. In this study, traditional asphalt (control beams) were prepared and tested for fatigue and used as reference beams in both sizes (standard and thin beams) in addition to testing fatigue resistance of Cape Seal (control and fibre modified) which was constructed on control thin beams. Standard size asphalt beams were modified by 0.2, 0.3, 0.4 & 0.5% cellulose fibre to determine which fibre content present the highest fatigue resistance.

It was found that 0.3% cellulose fibre-reinforced beams presented the highest fatigue resistance compared to control beams and other percentages of cellulose fibre and hence, thin beams were prepared in 0.3% cellulose and 0.3% textile fibre modified thin beams in addition to control thin beams.

Fibre-reinforced thin beams also showed improved fatigue resistance compared to control samples. Resistance to fatigue of thin and standard-size beams of the same materials (control and 0.3% cellulose fibre) didn’t show a significant difference. Fibre-reinforced Cape Seal beams showed improved fatigue resistance compared to control Cape Seal and control asphalt thin beams. Cellulose fibre-reinforced Cape Seal showed better fatigue resistance compared to textile fibre-reinforced Cape Seal. Finally, this study has also found a relationship between air voids generated by shear box compactor’s (SBC) software and air voids of the beams compacted by shear box compactor (SBC).