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Technical Data

Effect of MR on Asphalt Stiffness

Importance to Roads

Most modern pavements are designed using layered elastic mechanistic-empirical methods, in which each layer is assigned an elastic modulus and a Poisson's ratio.

The modulus, also referred to as stiffness, has a significant impact on pavement strength and a higher stiffness asphalt will provide either a longer lasting pavement or a thinner and more cost-effective pavement structure.

Methods of Evaluation

There are many protocols and test methods to characterise asphalt stiffness, including tensile tests, indirect tensile tests, flexural tests and compressive tests, on different sized samples and at different temperatures.

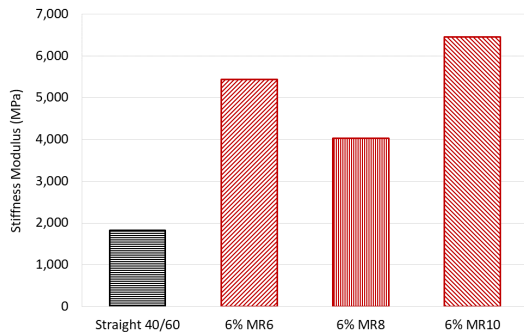
The test used is less important when comparing mixtures, as long as the test method, test protocol and temperature are consistent for all the mixes being compared.

Marshall Stability is also an indirect indicator of asphalt mixture modulus, with higher Stability indicating greater stiffness.

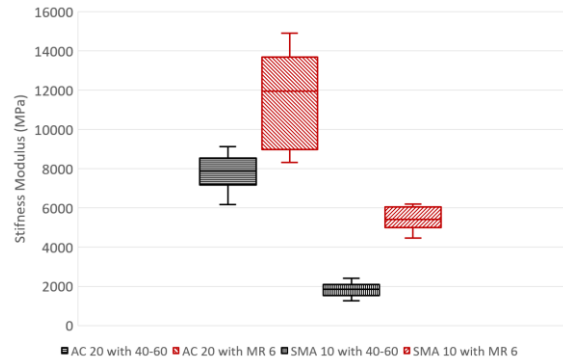
Effect of MacRebur

MacRebur MR 6, MR 8 and MR 10 significantly increase the stiffness (or modulus) of asphalt mixes compared to unmodified (penetration or viscosity grade) bitumens.

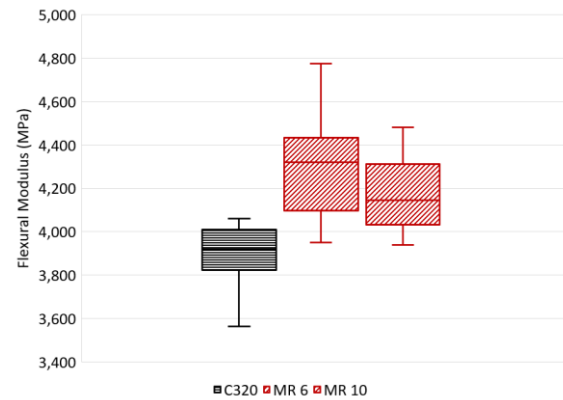
UK testing demonstrated a 2-3 fold increase in SMA 10 indirect tensile stiffness (stiffness modulus) for MR 6, MR 8 and MR 10 modified mix, compared to mix with unmodified 40-60 bitumen.



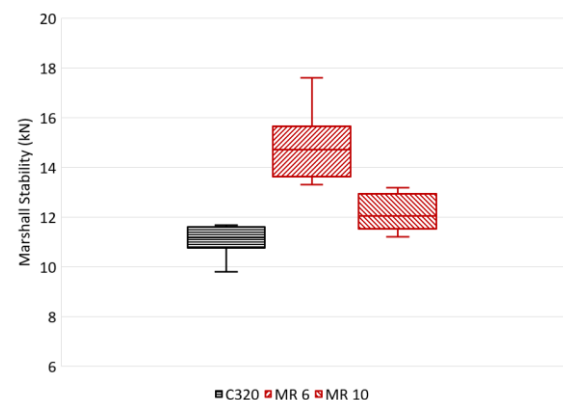
Separate UK testing also showed a significant increase in the average stiffness modulus for five replicates of SMA 10 and for five replicates of AC 20 (base-binder mix) compared to equivalent mixes with 40-60 bitumen.



Testing of four replicates of an Australian AC 14 (surface mix) demonstrated a significant increase in flexural modulus for both MR 6 and MR 10 modified products, compared to mixes with unmodified C320 (similar to 40-60 penetration grade bitumen).



Related Australian Marshall testing demonstrated a significant increase in the Marshall Stability.





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