

A LABORATORY INVESTIGATION ON THE FATIGUE PROPERTIES OF LOW ENERGY HOT ROLLED ASPHALT

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SUMMARY

Low Energy Hot Rolled Asphalt (LEHRA) is a Hot Rolled Asphalt (HRA) which incorporates pulverised fuel ash (pfa). This new environmentally friendly bituminous mix was developed at the Civil Engineering Materials Unit (CEMU) laboratories in the University of Leeds. Following a successful study which demonstrated that this new mix could be mixed and compacted at far lower temperatures than the conventional HRA, a road trial was constructed and monitored for 5 years. The results of this trial are reported in another paper presented to this conference. To assess the long term performance of LEHRA it was decided to investigate its fatigue behaviour carrying out conventional stress controlled dynamic loading tests.

Fatigue tests were carried out on beams made with various percentages of binder. The beams were loaded dynamically while fully supported on a rubber foundation. The strains generated were continuously monitored during loading. Numerous tests showed that fatigue does not lead to cracking and brittle failure of the LEHRA mixes exposed to normal ambient temperatures and normal traffic stresses. When the laboratory test conditions were changed to a cooler environment and the beam specimen was heavily notched fracture fatigue failure occurred.

From these experiments it was concluded that the best manner to assess the long term performance of hot rolled asphalt (HRA) and the new LEHRA was to calculate the dissipated energy caused by dynamic loading. The relations obtained showed that the number of loading cycles to dissipate a chosen quantity of energy was the same for HRA and LEHRA. This find highlights the fact that the low

energy hot rolled asphalt is not only a better mix in environmental terms, but that it is of the same quality and reached the same level of performance as the conventional, energy expensive, hot rolled asphalt.