

Performance Enhancing Fibres in Asphalt

Neil Turner
Excel Industries Ltd

Cellulose fibres produced from a variety of sources of waste paper are used in many industrial applications. At present the two largest markets for cellulose fibres are as a thermal insulating material in buildings and as a viscosity modifier in road asphalt products. The fibres are produced by shredding the paper into square inch size pieces and then milling to varying degrees of fineness. Key physical properties of cellulose fibre are as follows:

- i. Excellent Thermal Resistance
- ii. Viscosity Modification
- iii. Moisture Retention
- iv. Bulking/Re-enforcing Agent

In asphalt products advantage is taken of the propensity of cellulose fibre to modify the viscosity of bitumen. The first application was in stone mastic asphalt type products (SMA's). SMA's rely on a large amount of bitumen (typically 5.5 – 7.5% w/w on total asphalt mix), in order to provide a durable, rut and deformation resistant surface. At these high bitumen addition levels binder drainage or 'fattening' will occur during the laying process. The addition of cellulose fibre at 0.3% w/w of asphalt prevents binder drainage by modifying the viscosity of the bitumen and hence holding it to the stone.

Recent studies have shown that cellulose fibres can also be used in high friction surfaces. Work has been performed by TRL and Babbie investigating the effect of adding fibres into two-part epoxy resin systems. The aim of the study was to investigate the theory that the fibres would modify the viscosity of the epoxy resin leading to improved coverage when applied on high textured surfaces such as SMA. The study compared a normal two component epoxy system applied at 2.2kg/m² and a system containing 2% fibres and the resin applied at 1.8kg/m². Erosion index data, obtained from scuffing tests indicate that the system containing fibre produces a more durable surface even at the lower coverage compared to the system with fibre absent. Data from the 'pull out tests' indicate that the addition of cellulose fibre does not reduce the bonding between the resin and the SMA.

In conclusion, the addition of cellulose fibres to epoxy resin high friction surfaces provides significantly increased resin coverage with no detrimental effect on performance.