Ferro-Oil Capsule (Encapsulated Recycle Oil with Ferric Oxide for Self-Healing Potholes)

Tengku Rosman, Nik Nurfarahana (School: Sekolah Menengah Kebangsaan Kubang Bemban)
Mohd Nissham, Nur Hazwani Sahira
Ahmad Zainudin, Nurul Fayyadhah (School: Sekolah Menengah Kebangsaan Kubang Bemban)

This paper proposes Ferro-Oil Capsules (FOC) containing recycled cooking oil and ferric oxide to heal the crack of asphalt beam. To obtain the capsule shape, three different Ferro-Oil Capsules ratios of 10%, 20%, and 30% were incorporated into dense asphalt using the spherification technique. The effect of different ratio capsules addition to the asphalt substances has been investigated through the crack healing tests and the water absorption test. The test was implemented by comparing the strength recovery of the broken beams after healing to their original flexural strength. The capsules have been shown to be able to withstand the processes of mixing and compaction. When external loads are applied, the capsules rupture and release the liquid into the crack. By heating up the sample mixture, it can increase the magnetic field attraction of the ferric oxide particle to the bitumen, enabling it to seep into the cracks and act as a glue binder to 'self-heal' the potholes. The quality of the capsules in asphalt beams has a major impact on the degree of healing. We also perform water absorption tests to assess asphalt's ability to absorb water. The tendency of asphalt to crack will decrease if less water is absorbed by asphalt. The results indicate that the lowest Ferro-Oil Capsules content, which is a ratio of 10% in the mixture, has shown the best sample of healing the crack in the potholes. Furthermore, as time passes, the quality of asphalt beams will improve while installation and maintenance costs will decrease.

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