

## **The effect of type and particle size of industrial wastes filler on indirect tensile stiffness and fatigue performance of stone mastic asphalt mixtures**

### **ABSTRACT**

The purpose of this study is to evaluate the effect of type and particle size of industrial waste as filler on stiffness and fatigue performance of Stone Mastic Asphalt (SMA) Mixtures. In this study four types of industrial by-product wastes filler namely, limestone as reference filler, ceramic waste dust, coal fly ash, and steel slag dust with three size combination ratios, 100/0 passing the 0.075 mm, 50/50 passing 0.075 and 0.02, and 0/100 passing 0.02 mm sieve were used for direct comparison. The effect of different type and size of filler on the indirect tensile stiffness and fatigue properties of SMA bituminous mixtures was investigated. The Repeated Load Indirect Tensile Fatigue Test (ITFT) was carried out in accordance with British Standard DD ABF method Using Universal Testing Machine (UTM) on twelve SMA mixtures to establish fatigue failure criteria and to investigate the effect of waste fillers type and particle size on fatigue behavior of SMA mixtures. The parameters of fatigue functions for asphalt mixture with waste fillers are obtained and compared, and it confirms that the fatigue property of asphalt mixture can be improved especially at lower stress levels. Mixtures made with ceramic waste and coal fly ash with particle size ratio of 100/0, 50/50 respectively has resulted in increasing the fatigue life of SMA mixture. The only mixture that violated the increasing trend of fatigue damage resistance to cyclic loading was the mixture with steel slag dust.

**Keyword:** SMA; filler type; ITFT; Fatigue performance