Hot Mix Asphalt Pavement

NEEDS A CAPTION!

Introduction

Asphalt concrete pavement, or hot mix asphalt (HMA) pavement as it is more commonly called, refers to the bound layers of a flexible pavement structure. For most applications, asphalt concrete is placed as HMA, which is a mixture of coarse and fine aggregate, and asphalt binder. HMA is mixed, placed and compacted at elevated temperatures, hence the name. Asphalt concrete pavements can also be placed at ambient air temperatures, but HMA is the primary placement method for roads and interstates. The HMA is typically applied in 4-8 inch thick layers, with the lower layers acting to support the top layer, known as the surface or friction course. The aggregates in the lower layers are chosen to prevent rutting and failure, while the aggregates in the surface course are chosen for their friction properties and durability. There are a number of IRC materials with properties that make them excellent coarse or fine aggregates, or binder additives for asphalt concrete.

IRC Materials in Flowable Fill

When designing a HMA pavement the aggregate used must be strong and durable, and have a good angular shape to help resist rutting. The fine aggregate (mineral filler) is used to fill in the voids between the coarse particles, which increases the density of the asphalt concrete and provides load transfer between the larger particles. The asphalt binder is typically 5-6% of the mixture, and serves to bind the aggregates together. Asphalt binder is a petroleum derivative, though additional materials are often added to modify the properties of the binder.

A number of IRC materials have been used successfully as coarse aggregate in asphalt pavement, including crushed concrete, foundry sands, hydrated coal fly ash and slag. Air cooled blast furnace slag and steel slag in particular provide good rutting resistance and superior friction properties, making it a choice aggregate for the surface course. The same IRC materials can also be used as fine mineral filler materials. Coal fly ash has a long history of use as a mineral filler, and has been shown to prevent rutting, and its hydrophobic properties prevent stripping, which occurs when the asphalt cement debonds from the aggregate.

IRC materials have also been used as binder modifiers. Coal fly ash and slag have also been added to the asphalt cement to prevent stripping. The most commonly used binder modifier is ground rubber. It is added to the asphalt cement prior to mixing with the aggregates, which allows it to chemically react with the cement. Asphalt concrete pavements made with rubber modified asphalt cement tend to have less cracking, and wear better than regular pavements. The use of rubber in an open graded friction course also significantly reduces traffic noise.

Benefits

The immediate benefit of using IRC materials in asphalt pavement is a safer, more durable pavement. Using IRC materials can also save money by decreasing the need for asphalt binder, and by improving performance thus lessening the amount and frequency of required maintenance treatments to keep the pavement in good functioning condition. In addition, reusing materials reduces the need for mining virgin aggregate and the associated use of water, fuel and reduces carbon dioxide emissions, while also saving valuable landfill space.

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