

Evaluating the Use of Swedish by-Product Foundry Sand in Asphalt Mixtures

Authors : Dina Kuttah

Abstract : It is well known that recycling of by-product materials saves natural resources, reduces by-product volumes, and reduces the need for virgin materials. The steel industry produces a myriad of metal components for industrial chains, which in turn generates mineral discarded sand molds. Although these sands are clean before their use, after casting, they may contain contaminants. Therefore, huge quantities of excess by-product foundry sand (BFS) end up occupying large volumes in landfills. In Sweden, approximately 200000 tonnes of excess BFS end up in landfills. The transportation and construction industries have the greatest potential for reuse by-products because they use vast quantities of earthen materials annually. Accordingly, experimental work has been undertaken to evaluate the possible use of two chosen BFS from two Swedish foundries in a conventional Swedish asphalt mixture. The experimental procedure of this research has focused on the dosage, environmental and technical properties of the same mixture type ABT 11 and the same bitumen (160/220) but at different replacement proportions of the conventional fine sand with the two BFS. The environmental requirements, in addition to the technical requirements, namely, void ratio, static indirect tensile strength ratio, and resilient modulus before and after moisture-induced sensitivity tests of the asphalt mixtures, have been investigated in the current study. The test results demonstrated that the BFS from both foundries can be incorporated in the selected asphalt mixture at specified replacement proportions of the conventional fine sand fraction 0-2 mm, as discussed in the paper.

Keywords : asphalt mixtures, by-product foundry sand, indirect tensile strength, moisture induced sensitivity tests, resilient modulus

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