

Mechanical Properties and Durability of Concretes Manufactured Using Pre-Coated Recycled Fine Aggregate

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Abstract : This study investigated the mechanical properties and durability of concrete produced using recycled fine aggregate (RFA) pre-coated with fly ash, slag, and a polymer solution (PVA). We investigated the physical and microscopic properties of fresh concrete while adjusting several of the fabrication parameters, such as the constituent makeup and thickness of RFA pre-coatings. The study is divided into two parts. The first part involves mortar testing in which the RFA used for coating had a water/cement ratio of 0.5 and fly ash, slag, and PVA viscosity of 5~6cps, 21~26cps, 25~30cps, or 44~50cps. In these tests, 100% of the natural fine aggregate was replaced by RCA. The second part of the study involved the mixing of concrete with 25% FRA, which was respectively coated with fly ash, slag, or PVA at a viscosity of 44~50cps. In these tests, the water/cement ratio was either .4 or 0.6. The major findings in this study are summarized as follows: Coating RFA coated with fly ash and PVA was shown to increase flow in the fresh concrete; however, the coating of FRA with slag resulted in a slight decrease in flow. Coating FRA with slag was shown to improve the compressive and splitting strength to a greater degree than that achieved by coating FRA with fly ash and PVA. The mechanical properties of concrete mixed with slag were shown to increase with the thickness of the coating. Coating FRA with slag was also shown to enhance the durability of the concrete, regardless of the water/cement ratio.

Keywords : recycled fine aggregates, pre-coated, fly ash, slag, pre-coated thickness

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