

Influence of partial substitution of sand with crumb rubber on the microstructural and mechanical properties of concrete in Pretoria, South Africa

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Abstract: Utilisation of waste materials such as crumb rubber for construction purposes is still in the formative stage in Africa. Experimental evaluation is required to encourage the use of crumb rubber for concrete production. The engineering properties of modified crumb rubber concrete were evaluated by substituting 1, 2, 3 and 4% sand content with crumb rubber. The concrete samples were investigated with slump, bulk density, compressive and tensile splitting strengths, energy dispersive X-ray spectroscopy (EDS) and scanning electron microscopy (SEM) tests. The results showed that very small quantity of crumb rubber can improve both the microstructures and mechanical properties of concrete; however, utilisation of large quantities of crumb rubber can reduce the mechanical and microstructural properties of concrete. Implementation of crumb rubber as a substitute for sand in concrete can service and conserve the environment, reduce hazardous disposal of waste tyre rubber and enhance conversion of waste tyre rubber to useful.

Keywords: concrete, construction, crumb rubber, environment, mechanical properties, microstructures, South Africa.