

Title: Mechanical properties of concrete using crumb rubber and human hair fiber

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Abstract: Nowadays, an enormous amount of scrap tires being disposed of causes severe environmental solid waste concerns. According to previous research, these waste tires can partially replace normal aggregates to make crumb rubberized concrete (CRC). Human hair (HH) has also been found in different research as a beneficial component in concrete. In this study, crumb rubber (CR) was used as a fine aggregate substituting sand by 5%, 10%, and 15%, and HH was utilized as a fiber in amounts of 1%, 2%, and 3% by weight of cement in the concrete mix. According to the test results, workability was improved, but density was reduced by adding CR and human hair fiber (HHF) to the concrete mix. In addition, compressive strength decreased from 6.23% to 21.85%, and splitting tensile strength decreased from 17% to 33% compared to the normal concrete with increasing percentages of CR from 5% to 15%. In contrast, these strengths improved by 13.23% when 1% HHF was used in the normal concrete mix, but a decreasing trend was observed for more than 1% of HHF. A good improvement of 3.6% in compressive strength and 8.56% in splitting tensile strength was found for a combination of 5% CR and 1% HHF in the concrete mix compared to the normal concrete. However, all other combinations resulted in a loss in these qualities.

Keywords: Scrap tire, Solid waste, Crumb rubber, Human hair fiber, Concrete production

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