

AN EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF CEMENT BY SILICA FUME AND FINE AGGREGATE BY GLASS

POWDER IN CONCRETE

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ABSTRACT

Concrete is the most important engineering material and the addition of some other materials may change the properties of concrete like workability, durability, strength, and permeability. Engineers are trying to improve its performance with the help of innovative chemical admixtures, SCMs and waste materials thereby minimizing the consumption of natural resources.

Silica fume (SF) is very fine non-crystalline material, non-metallic and non-hazardous waste of industries. It is produced in electric arc furnace as a by-product of the production elemental silicon's or alloys containing silicon. It is usually grey color powder and SCMs. The effect of silica fume in concrete is because of its fineness and ability to replace certain amount of cement. SF improves both strength and durability of concrete and used in making high strength and high impermeability concrete.

Glass is widely used in our lives through manufactured products such as sheet glass, bottles, etc. In various places, damaged glass sheets & sheet glass cuttings are go to waste and usually delivered to landfills for disposal. We can conserve environment by using GP in concrete production.

The experiments aim is to find the strength of concrete by mixing highest % of replaced material together. By replacing different percentages of Silica fume as cement replacement (up to 20%) and Glass powder as fine aggregate replacement (up to 40%) for M25 grade concrete mix.

The concrete specimens were tested for compressive and splitting tensile strength at 7 and 28 days for 150 mm cubes and cylinder. The ingredients are mixed in 1: 1.43: 2.73 proportions with 0.45 w/c ratio. The results have indicated that the strength increases up to certain percentage (15% replacement of cement by SF), (20% replacement of FA by GP).

KEYWORDS: Silica Fume, Glass Powder, Cement, Natural Sand, Tensile Strength, Compressive Strength