

Effect of High Volume processed Fly Ash on Engineering Properties of Concrete

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Abstract : As everyone knows, fly ash is a residual material we get upon energy production using coal. It has found numerous advantages for use in the concrete industry like improved workability, increased ultimate strength, reduced bleeding, reduced permeability, better finish and reduced heat of hydration. Types of fly ash depend on the type of coal and the coal combustion process. It is a pozzolanic material and has mainly two classes, F and C, based on the chemical composition. The fly ash used for this experimental work contains significant amount of lime and would be categorized as type F fly ash. Generally all types of fly ash have particle size less than 0.075mm. The fineness and lime content of fly ash are very important as they will affect the air content and water demand of the concrete, thereby affecting the durability and strength of the concrete. The present work has been done to optimize the use of fly ash to produce concrete with improved results and added benefits. A series of tests are carried out, analyzed and compared with concrete manufactured using only Portland cement as a binder. The present study is carried out for concrete mix with replacement of cement with different proportions of fly ash. Two concrete mixes M25 and M30 were studied with six replacements of cement with fly ash i.e. 40%, 45%, 50%, 55%, 60% and 65% for 7-day, 14-day, 28-day, 56-day and 90-day. Study focused on compressive strength, split tensile strength, modulus of elasticity and modulus of rupture of concrete. Study clearly revealed that cement replacement by any proportion of fly ash failed to achieve early strength. Replacement of 40% and 45% succeeded in achieving required flexural strength for M25 and M30 grade of concrete.

Keywords : processed fly ash, engineering properties of concrete, pozzolanic, lime content

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