Lecture Notes in Civil Engineering

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Ramakant Agrawal *Editors*

Recent Trends in Civil Engineering

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Contents

Concrete Technology

Influence of Partial Replacement of Cement by Industrial Wastes on Properties of Concrete

Nikhil Kumar Verma

Abstract With express increase in the demand of high rise structure with high strength concrete in construction industry, led to enhance the cement consumption. The cement production consumes large energy and liberates CO_2 during manufacturing of cement and concrete, resulting to environmental imbalance. Researchers are putting their untiring effort to conserve energy and control the environmental degradation, an attempt has been made to reduce the cement consumption by partially replacing it with pozzolanic materials. In the present study, attempt has been made to evaluate the strength properties of high strength concrete made of cement mixed with green and pozzolanic material like "Fly Ash and Silica Fume". Using partial replacement method, in portland cement concrete, the percentage of fly ash adopted is 0, 10, and 20% and percentage of silica fume adopted is 0, 5, 10, and 15% for each percentage of fly ash replacement. Polycarboxylate Ether based Superplasticizer is used for desired workability with water to binder ratio as 0.3. Twelve different concrete mixes are prepared with ordinary portland cement, silica fume, and fly ash. Specimens are put to curing for 7, 28, and 90 days. Different properties such as workability, cube compressive strength, split tensile strength are investigated for the concrete. From the various test it is concluded that the nature of strength gain in the above concrete with fly ash and silica fume is in conformity with concrete made with OPC only. The optimum content of fly ash and silica was found to be 0 and 10% for 7 and 28 days cube compressive strength, but for 90 days strength, optimum content is observed to be 10 and 10% of fly ash and silica, respectively. Thus, increase in strength properties for the above shown values as compared to that of normal concrete are significantly good.

Keywords Fly ash · Silica fume · Concrete

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