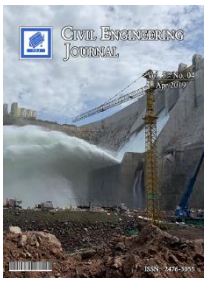
Available online at www.CivileJournal.org

Civil Engineering Journal

Vol. 5, No. 4, April, 2019



GGBS And Fly Ash Effects on Compressive Strength by Partial Replacement of Cement Concrete

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Received 09 January 2019; Accepted 26 March 2019

Abstract

This paper investigates the compressive strength properties of concrete with Ground Granulated Blast Furnace Slag (GGBS) and Fly Ash in concrete by partial replacement of cement. The incremental demand of cement in the construction field is a concern for environmental degradation, in this regard; replacement of cement is carried out with waste materials by using GGBS and Fly Ash. On optimum level of GGBS and Fly Ash was assessed with varied percentage from 0 to 30% for different curing days. Replaced concrete were tested with the slump, compaction factor, Vee-bee and compressive strength. Cement to water ratio was maintained at 0.47 for all mixes. The compressive strength tests were conducted for 3, 7, 14 and 28 days of curing on a M25 grade concrete. The results obtained from the slump, compaction factor, Vee-bee and compressive strength of concrete containing GGBS and Fly Ash was increased as the curing time increases. The workability of replaced concrete improved when slump value achieved 30% as compared to controlled one SF0 and the compressive strength obtained 26.30% improvement at SF9 as compared to SF0. The outcomes indicated that the addition of GGBS and Fly Ash enhances the workability and compressive strength which eventually improved the mechanical properties of concrete.

Keywords: GGBS; Fly Ash; Compressive Strength; Slump; Compaction Factor; Vee-bee.

1. Introduction

Construction industry has become one of the most important part of a country's economic and social development [1]. Concrete has been utilized by the construction industry for the construction of most of the infrastructures which range from construction of foundations to retaining walls, dams to bridges, residential houses to tall skyscrapers [2]. The most predominately used binder in concrete is blended cement. Today, public and private organizations have been giving considerable importance to different construction materials on account of their environmental behavior. The growing use of cement made concrete in building projects and subsequent emission of harmful gases into the atmosphere causes a significant rise in earth's temperature [4]. One thousand kilograms of cement produce nearly similar amount of carbon dioxide (CO_2) [5]. According to an estimate, around 6–8% of the total CO_2 globally emitted comes from ordinary cement production [6]. The concrete has been investigated currently in favor of depleting carbon dioxide emissions and enhancing the performance eventually reducing in the cost of construction [3]. Keeping in view eco-friendly approaches and utilization of industrial solid waste or by-product materials as replacement of cement has been considered under construction for the generation of cement and concrete because it shares less amount of consumption of natural resources

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http://dx.doi.org/10.28991/cej-2019-03091299