International Journal of Civil, Structural,
Environmental & Infrastructure (IJCSEIERD)
ISSN(P): 2249-6866; ISSN(E): 2249-7978
Vol. 4, Issue 4, Aug 2014, 61-74

MICRO-LEVEL STUDIES ON SELF COMPACTING CONCRETE

N. KRISHNA MURTHY[1], A. V. NARASIMHA RAO[2] & I. V. RAMANA REDDY[3]

[1]Research Scholar, S. V. University, Tirupati, Andhra Pradesh, India

[1]Assistant Executive Engineer, Department of Irrigation and CAD, AVRHNSS, Madanapalle, Andhra Pradesh, India

[2&3]Professor, Department of Civil Engineering, S. V. University, Tirupati, Andhra Pradesh, India

ABSTRACT

Concrete is the most commonly used material for construction. The worldwide production of cement has greatly increased since 1990.Production of cement results in a lot of environmental pollution as it involves the emission of CO_2 gas. Supplementary cementitious materials (SCMs) are finely ground solid materials that are used to replace a portion of the cement in a concrete mixture. These supplementary materials may be naturally occurring, manufactured or manmade waste. Various types of pozzolanic materials that improve cement properties have been used in cement industry for a long time. Metakaolin is a dehydroxylated aluminium silicate. It is an amorphous non- crystallized material, constituted of lamellar particles. From the recent research works using Metakaolin, it is evident that it is a very effective pozzolanic material and it effectively enhances the strength and durability properties of concrete. The research study reported in this paper is on the effects of Metakaolin and class F fly ash on the micro-level properties of SCC at different replacements of cement at various curing periods. The micro-level studies such as Scanning Electron Microscopy (SEM) and Energy Dispersive x-ray Spectrometry (EDS) for 28 and 90 days have been reported. Scanning Electron Microscope (SEM) images indicated that the addition of cement concrete with Metakaolin the formation C-S-H gel in ordinary Portland cement with high performance Superplasticizer cum retarder which was done by finding the various predominant elements present and compounds formed by using EDS analysis. The micro-level properties studied were the micro-crack widths between aggregate and paste, and the chemical elements and atomic Calcium-Silica of the paste near the Interfacial Transition Zone (ITZ). It has been suggested that micro-cracks in the ITZ play an important role in determining not only the hardened properties but also the permeability and durability properties of concrete (Mehta and Monteiro, 2006). Modification of the micro-structure in the ITZ has been one of the greatest concerns since durability and strength of concrete are significantly influenced.

KEYWORDS: Concrete, Construction, Cement