

On Compressive Strength of Commonly Used Grades of Concrete using NALCO Fly ash

Dr. Dhanada K. Mishra

Principal, JITM, Paralakhemundi

Orissa INDIA 761211

dkmishra@jitm.org

Abstract

By substituting fly ash for Portland cement, CO₂ emissions will be reduced significantly. A valuable resource that would otherwise have been disposed off in landfills, fly ash imparts desirable physical and chemical characteristics to Portland cement concrete. While in India the productive use of the over 100 million tones of fly ash generated annually has climbed from a low 5% to about 40% today, the same is not the case in the eastern province of Orissa where 26% of the proven coal reserves are located and a large quantity of fly ash is being generated. In the current work compressive strength development of concrete with fly ash generated by the captive power plant of NALCO (National Aluminum Company) in Angul, Orissa was studied. Several design mixes of concrete of selected grades were developed by maximum utilization of fly ash as a mineral admixture. Bureau of Indian Standards (BIS) methods were used to develop M₂₀, M₃₀, M₄₀ grade concrete by 40% cement replacement by fly ash. Superplasticizer is used to compensate for early age loss of strength by reduction in water binder ratio and it is demonstrated that 28 day target strengths can be achieved in concrete using 40% fly ash. Later age strengths show remarkable gain compared to control mix. Successful demonstration of use of local fly ash in concrete will go a long way in encouraging increased use of fly ash in construction.

Submitted for consideration in the World of Coal Ash 2007 Conference, held May 7-10, 2007.