

Impact of Coal Combustion Fly Ash used as a Binder in Pavement

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ABSTRACT

Highway Engineers have long back recognized the importance of long term benefits of increasing the strength and durability of pavement by mixing cementitious binder during the construction of pavements. Fly ash is a pozzolanic powdery residue collected in electric or mechanical dust collectors following combustion of coal in coal fired power plants. There are many possible applications of this cheap binder, among others, the road construction industry can use it in large quantities, reducing the costs and solving environmental problems as well. The utilization of this by-product as a geopolymer raw material can effectively solve the environmental risk due to its good mechanical behavior and immobilization capacity. Based on laboratory experimental results it can be concluded that mechanical activation of the raw fly ash has a positive effect on geopolymerisation. The present paper deals with a general overview of fly ash and two prosperous fly ash utilization possibilities: 1) hydraulic binder and 2) geopolymer through laboratory experimental results. The key to a fly ash-based geopolymer product with optimum binding properties was stated by Ferndandez-Jimenez to be derived from using a fly ash material with the following properties: less than five percent of unburned material; less than 10 percent Fe₂O₃; a low content of CaO; 40–50 percent relative silica; 80–90 percent of particles with diameter equal to or less than 45 μm; and a high vitreous phase.

Keywords: Compressive strength, Cementitious binder, Geopolymer, Pozzolanic Reactions, Durability.