

LCA and Multi-Criteria Analysis of Fly Ash Concrete Pavements

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Abstract : Rapid industrialization results in increased use of natural resources bring along serious ecological and environmental imbalance due to the dumping of industrial wastes. Principles of sustainable construction have to be accepted with regard to the consumption of natural resources and the production of harmful emissions. Cement is a great importance raw material in the building industry and today is its large amount used in the construction of concrete pavements. Concerning raw materials cost and producing CO₂ emission the replacing of cement in concrete mixtures with more sustainable materials is necessary. To reduce this environmental impact people all over the world are looking for a solution. Over a period of last ten years, the image of fly ash has completely been changed from a polluting waste to resource material and it can solve the major problems of cement use. Fly ash concretes are proposed as a potential approach for achieving substantial reductions in cement. It is known that it improves the workability of concrete, extends the life cycle of concrete roads, and reduces energy use and greenhouse gas as well as amount of coal combustion products that must be disposed in landfills. Life cycle assessment also proved that a concrete pavement with fly ash cement replacement is considerably more environmentally friendly compared to standard concrete roads. In addition, fly ash is cheap raw material, and the costs saving are guaranteed. The strength properties, resistance to a frost or de-icing salts, which are important characteristics in the construction of concrete pavements, have reached the required standards as well. In terms of human health it can't be stated that a concrete cover with fly ash could be dangerous compared with a cover without fly ash. Final Multi-criteria analysis also pointed that a concrete with fly ash is a clearly proper solution.

Keywords : life cycle assessment, fly ash, waste, concrete pavements

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