**Selection of Optimized Mix Proportion of Bagasse Ash blended Cement Mortar using Analytic Hierarchy Process (AHP)**

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**Abstract.**

Durability is an important aspect in determining the performance of concrete structures. Various criteria like water permeability, drying shrinkage, saturated water absorption, porosity, sorptivity, sea water resistance, acid resistance and air content are used in determining the durability of cement mortar and concrete. The results of the durability properties at 90 days are best suited in determining the performance of the concrete structures and mortars. In this paper, cement mortars blended with sugarcane bagasse ash (SCBA) are studied for their durability properties at 90 days. One control cement mortar specimen and four specimens at 5%, 10%, 15% and 20% replacement for cement are prepared and their properties are compared. Since there are eight durability properties in consideration, it is difficult to analyze the performance of the blended cement mortars. Hence, an optimization methodology is adapted to combine all the durability properties into a single value and rank the specimens. By ranking the specimens, the optimum percentage of replacement of bagasse ash is determined. Analytic Hierarchy Process (AHP) is the optimization methodology used in evaluating the performance of the specimens based on durability criteria. It is an effective tool for dealing with complex decision making, and may aid the decision maker to set priorities and make the best decision. In addition, the AHP incorporates a useful technique for checking the consistency of the decision maker’s evaluations, thus reducing the bias in the decision making process. In this technique all the durability criteria for the cement mortar are compared with each other based on their importance in determining the performance. Finally, a single value is obtained by relating all the eight properties considered using AHP and the optimized mix proportion for replacement of bagasse ash is determined.