

**Investigation of suitable concrete for coastal marine structures by the partial replacement
of cement with FLY ASH**

Augustine Fahnlon Taylor

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University of Dar es Salaam, college of Engineering and Technology, 2017

The deterioration of several Concrete infrastructures in marine environments has serious consequences on the efficiency and profitability of other sectors of the economy worldwide. The maintenance and replacement costs have caught the attentions of stakeholders; engineers and contractors in design and construction, researchers and end-users whose quality of lives is affected by these constructed facilities. In order to contribute to the solution of this problem of deterioration of concrete infrastructures in marine environments which remains subject for research, this study was initiated. According, the study undertook mix design, and concrete tests on cubes, cylinders and beams in order to achieve the objective of optimizing the blending of ordinary Portland cement with fly ash to produce concrete that is suitable for coastal marine structures. The investigation was carried out to evaluate the mechanical properties of fly- ash based cement concrete mixtures in grades C35 and C40 concrete, subjected to two exposure conditions, tap water and sea water. In the study ordinary Portland cement was partially replaced with ASTM class F fly ash at four percentages levels 5%, 10%, 15% and 20% by weight in two grades of concrete.

Based on the experimental tests results, the following key findings were obtained:

- The fly ash reduces permeability and improves concrete resistance against carbonation
- There is an optimum amount of fly ash that can be used in concrete to maximize the technical, environmental and economic benefits.

The findings indicate improved performance of concrete while maintaining its durability, and suitability in the given environment.