

## STUDY ON USING BOTTOM ASH IN MANUFACTURING CONVENTIONAL CEMENT BLOCKS

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Bottom ash is a common by-product of thermal power plants or boilers. Due to the depletion of natural sources of fine aggregates, there is a need to encourage the use of alternative materials. In this study, coal bottom ash is used as replacement for fine aggregates. From an environmental and economical point of view, the use of coal bottom ash in cement mixtures is a beneficial application.

The significance of the present study is maximizing the utilization of coal bottom ash by using it in the manufacturing process of conventional 300mm x 100mm x 150mm solid cement blocks and then checking its suitability to the construction industry against Sri Lankan standards. Finally, statistical models were developed between compressive strength, water absorption, density, and other input variables.

The raw materials utilized in this experimental study were ordinary Portland cement, manufactured sand, bottom ash, and water. Bottom ash from Brandix Textile (Pvt) Ltd., Wayamba Industrial Zone, Makandura, Gonawilla, Sri Lanka was used to replace manufactured sand at different percentages by volume of sand. 1:6 cement: fine aggregate mix proportion was proposed for this experiment with the 0.5 consistent water/cement ratio. In this study, conventional vibro-compaction was used to mould the cement blocks. The blocks were cured by spraying water twice a day till the day of testing. Finally, the mechanical and durability properties of cement blocks were determined at the ages of 14<sup>th</sup>, 28<sup>th</sup>, and 56<sup>th</sup> days.

The results showed that the density and compressive strength of cement blocks decreased, and water absorption increased with an increasing replacement level of bottom ash. From the analysis, it can be concluded that up to 45% of fine aggregate in the cement blocks can be replaced with sieved coal bottom ash in small and medium scale conventional cement block manufacturing using the mix proportions attempted in the present study.

**Keywords: cement blocks; cement mixtures; coal bottom ash; coal-fired boiler; statistical models**

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