THE APPLICABILITY OF RECYCLED WASTE PAPER AS LIGHTWEIGHT BUILDING MATERIALS

Oriyomi M Okeyinka

Supervisory team: Dr David A Oloke (Dos) , Prof. Khatib Jamal

UNIVERSITY OF WOLVERHAMPTON
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School of Technology

Abstract

The high consumption of natural resources, such as sand, gravel, clay and wood attributed to the building construction industry, coupled with the need for affordable housing and environmentally sustainable building materials has led to studies on the possibilities of producing alternative building materials from wastes. Considering the gaps in the level of research efforts till date, this study was conducted to determine a suitable mix proportioning process for the production of lightweight building block from postconsumer waste paper **using waste additives as binder in the place of the more traditional hydraulic binder**. The laboratory experimentation carried out involved the processing of waste paper into an artificial lightweight aggregate, designing and preparing trial mixes, moulding of trial specimen and subjecting trial specimen to compressive strength test at 28days curing age. It was found that at the appropriate mixture of waste paper, sand and waste additive (binder), the trial specimen displayed an average compressive strength ranging from a highest of 2.07MPa to a lowest of 1.3MPa, this strength satisfies the minimum standard strength requirement for non- load bearing masonry block. This result thus indicates the possibilities of producing an environmentally friendly, non load-bearing, lightweight building material with less use of natural resources. Future work will entail, the moulding of trial block specimen using the hydraulic press to apply equivalent compactive effort and subsequent selection of final mix composition will mark the end of this preliminary experimentation. The main experimentation will involve, the moulding of the proposed lightweight blocks to be tested in accordance with relevant standards

Background

The environmental pollution resulting from industrial and domestic waste material is one of the biggest problems facing the human race and much concentrated effort is being put into solving this problem on a worldwide basis.

- MSW is growing faster than the rate of urbanization
- Global Increase of per capital municipal solid waste (MSW) generation per day from 0.64kg/day in 2002 to 1.2kg/day in 2012(world bank 2012)
- Prediction of global population growing to 9.6 billion by 2050(EurActive ,2014)

Objective

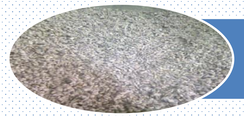
To develop a mixture proportioning process for the development of a lightweight, non load bearing block, from recycled wastepaper without the use of hydraulic binder

Methodology

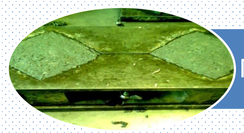

Collection of wastepaper

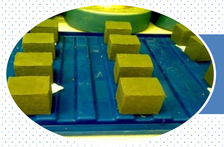

Collection of waste additive (binder)


Processing of wastepaper


Processed wastepaper


Design and Preparation of trial mixes


Moulding of trial specimen


Curing of trial specimen


Compression strength test

Results and Findings

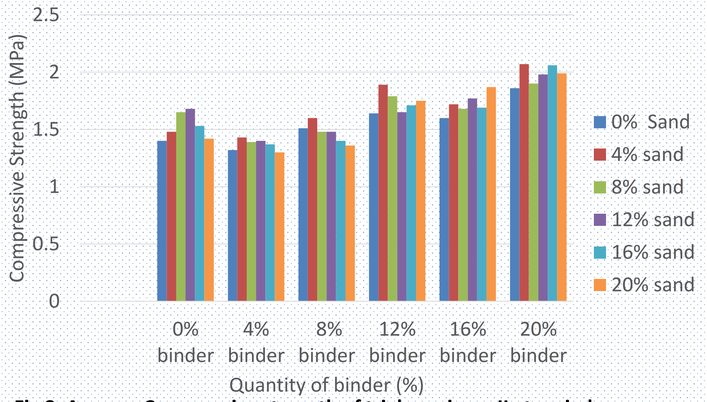
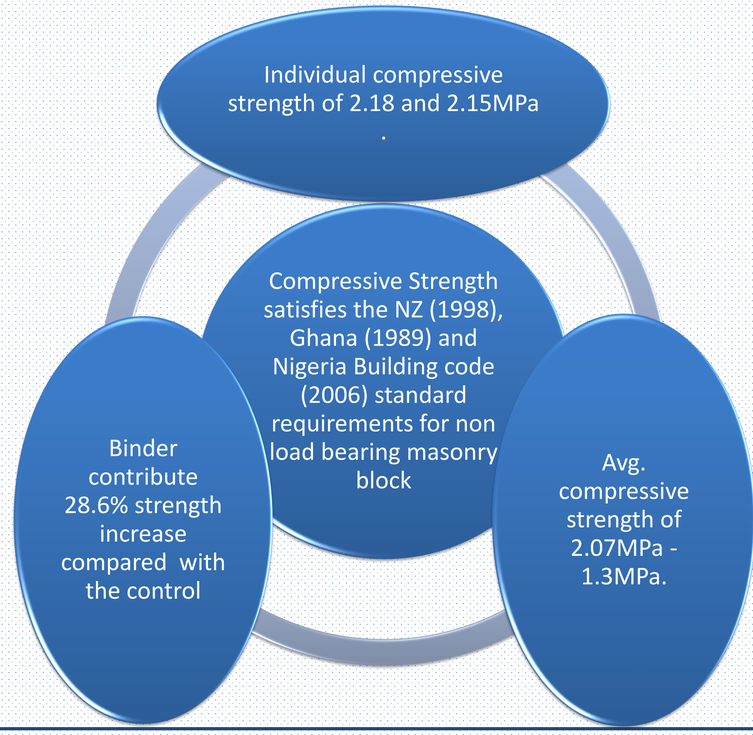


Fig 8: Average Compressive strength of trial specimen II at varied quantities of binder and sand



Future work in Progress

Optimization of method of application of compactive effort from tamping method to use of hydraulic press

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