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Autoclaved Aerated Concrete (AAC); An Eco Friendly Building Material: A Brief Study

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Abstract: ***Autoclaved Aerated Concrete (AAC) is an eco-friendly building material. It is a product of fly ash which is mixed with lime, cement, aluminum powder and water in a certain proportion. The use of fly ash, a waste product collected from coal based thermal power plant can be consumed as a significant resource as building material. AAC is a best option for traditional red clay brick and cement brick. It is useful in residential, commercial and industrial construction projects. In this study, the review covers the study about AAC concrete blocks, advantages and its importance, AAC block manufacturing and its potential use as green construction material.***

Keywords: ***Autoclaved Aerated Concrete, AAC block, Red Brick, Fly Ash***

I. INTRODUCTION

A. About AAC

Brick industry is the backbone of construction sector in India. Due to the rapid urbanization the demand of building material is increasing day by day. Autoclaved Aerated Concrete (AAC) industry is an emerging sector worldwide especially mega populated countries like India. The Swedish architect Dr. Johan Axel Eriksson, along working with Professor Henrik Kreüger developed Autoclaved aerated concrete in 1924 at the Royal Institute of Technology [1]. It is one of the major achievements of the 20th century in the field of construction. AAC block is lightweight and offers ultimate workability, flexibility and durability; simultaneously provides structure, insulation, fire and mold resistance. AAC Blocks is a unique and excellent type of building materials due to its superb properties. AAC blocks is the ideal solutions for brick replacement. It is one of the eco-friendly and certified green building material. AAC offers incredible opportunities to increase building quality and at the same time reduce costs at the construction site. AAC blocks are a unique and revolutionary building material due to its super temperature, fire and sound resistance properties. Light weight concrete is widely popular due to its low weight, high strength, low thermal conductivity, low shrinkage, low absorption and high heat resistance property [2].



Fig 1: AAC Blocks

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B. AAC Block Manufacturing

AAC blocks are manufactured using easily available materials. The manufacturing process is clean and does not emit any hazardous chemicals. Manufacturing of AAC block involves following steps-

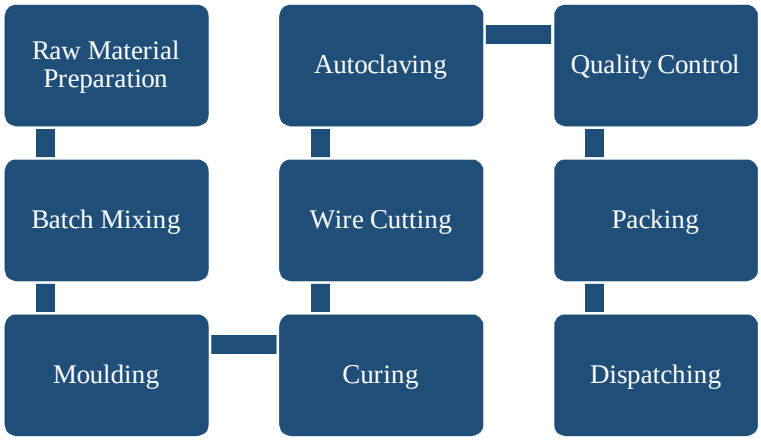


Fig 2: AAC Block Manufacturing Process

C. Advantages of AAC Blocks

1) Light in weight
2) Its porous structure gives superior fire resistance
3) It reduces the heating and cooling load in buildings
4) Provides accurate cutting, which minimizes the generation of solid waste during use
5) Light in weight saves cost and energy in transportation, labour expenses
6) Increases chances of survival during seismic activity
7) Large size blocks leads to faster masonry work
8) It produces very less solid waste, thus environmentally friendly
9) AAC is fire resistant
10) It helps to prevent condensation and other problems that are related to fungi mildew
11) The life of this material is extended because it is not affected by harsh climates or extreme weather changes. It is long lasting.

D. Cost Saving Benefits of AAC Block

1) It reduces overall construction cost by 30%
2) Reduces construction time by 20%
3) Reduces operating cost by 30-40%
4) Superior thermal insulation of the blocks reduces the need to turn on the air conditioner which in turn helps in saving electricity costs
5) No emission of Carbon Di-Oxide (Co2)
6) No burning of fossil fuel (Coal)

E. Literature Review

AAC is a long proven material. AAC block is used in a wide range of commercial, industrial and residential application due to its construction friendly properties. Many researcher have discussed potential use and significance of AAC block over masonry block in construction sector [3]. W.Y.Vivian explained the cost difference between conventional brick and AAC blocks [4]. Also in one research P. Gautam and N. Saxena compared AAC Blocks with red bricks [5]. As per one report Importance of lightweight material to enhance thermal insulation properties and to decrease thermal load coming on the building is well explained by S. Raut et al. in 2013[6]. The effect of dosage of Aluminium powder and fineness on the properties of moist-cured aerated concrete such as workability, rate of aeration, fresh and dry density, Compressive strength, water absorption etc.studied by E. Muthu Kumarand K. Ramamurthy in 2017 [7]. In a research article T.M. Prakash, Dr.B.G. Naresh Kumar and Dr. Karisiddappa explained about the physical and elastic property of AAC blocks [8].

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II. DISCUSSION

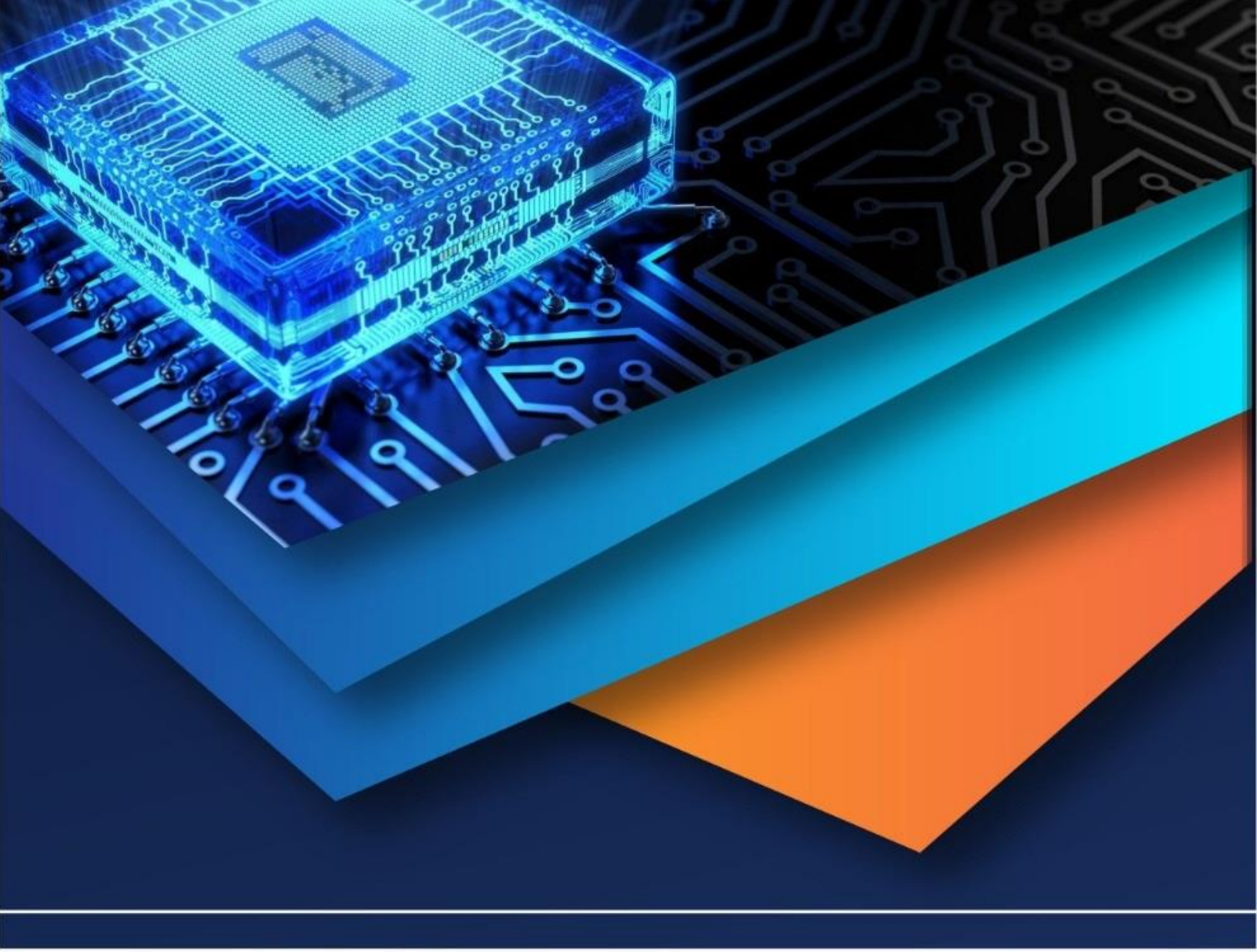
Autoclaved Aerated Concrete is a lightweight, eco-friendly building material. It is manufactured from easily available raw materials and a notorious waste-fly ash. The entire production process of AAC block emits no pollutants. By considering many merits, AAC blocks are best option for red clay bricks. AAC is one of the most suitable and sustainable building materials in the present era. More attention is needed in the AAC block strength test, accurate mixing proportion to fulfill the demand of quality material for construction industry.

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