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INNOVATING CONSTRUCTION: COTTON THREAD AS AN ADMIXTURE IN CEMENT BRICKS

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ABSTRACT

This project introduces an innovative approach to brick manufacturing by incorporating cotton thread reinforcement, aiming to enhance both structural integrity and sustainability in construction practices. Through experimental analysis, the study evaluates the mechanical properties of cotton thread-reinforced bricks, focusing on compressive strength, tensile strength, and crack resistance. Compared to conventional bricks, cotton thread-reinforced bricks exhibit promising results in terms of improved strength and durability. Additionally, the use of cotton thread as a reinforcement material offers environmental benefits, as it is biodegradable and renewable. By reducing reliance on conventional materials such as steel, this innovation contributes to lowering carbon emissions and promoting eco-friendly construction practices. Overall, the integration of cotton thread reinforcement represents a significant advancement in sustainable construction materials, offering a viable solution for both structural performance and environmental conservation.

Keywords: Cotton Thread, Bricks, Sustainability, Admixture, Flexibility, Eco-Friendly.

I. INTRODUCTION

In recent years, the quest for sustainable and eco-friendly solutions in the construction industry has sparked innovation and exploration into alternative building materials and techniques. Among these endeavours, the integration of cotton thread as a reinforcing agent in cement bricks has emerged as a promising avenue. This novel approach aims to not only enhance the structural properties of conventional bricks but also address pressing concerns such as material costs, environmental impact, and sustainability. The utilization of cotton thread as an admixture in cement bricks holds the potential to revolutionize traditional construction practices. By augmenting the composition of bricks with cotton thread, researchers seek to bolster key attributes such as tensile strength, flexibility, and thermal insulation. This innovative concept not only promises improvements in structural integrity but also offers a pathway towards more sustainable building practices.

Through meticulous laboratory experimentation and analysis, researchers are delving into the optimal ratios of cotton thread to cement mixture, aiming to unlock the full potential of this approach. By elucidating the feasibility and efficacy of cotton thread reinforcement in bricks, this research endeavours to provide valuable insights into its practical application within the construction industry.

V Palanisamy (2007) Based on the present studies, it is concluded that up to 20% of pulverized and sieved sludge, along with additives such as fly ash, sand, cement, and quarry dust, can achieve the minimal required compressive strength and water absorption.

Further research is recommended, including the analysis of the chemical nature of the sludge through periodic analyses conducted on sludge produced in various chemical processing industries. Additionally, leachability and toxicity analyses on both the sludge and sludge bricks should be performed. Furthermore, exploring other potential applications for utilizing sludge is suggested.

S.K.Agrawal, R.K.Watile, P.V.Mohata, S.C.Makwana (2013) The study explores various parameters and provides evidence through observations on the burning characteristics of cotton, polyester, and viscose fibers. Cotton fibers burn, leaving a small amount of fluffy grey ash, while polyester melts and forms a hard, non-crushable tawny-colored bead. Viscose exhibits a burning tendency similar to cotton. The research delves into the physical properties of the materials. Test results indicate that incorporating PC (probably cotton), PV

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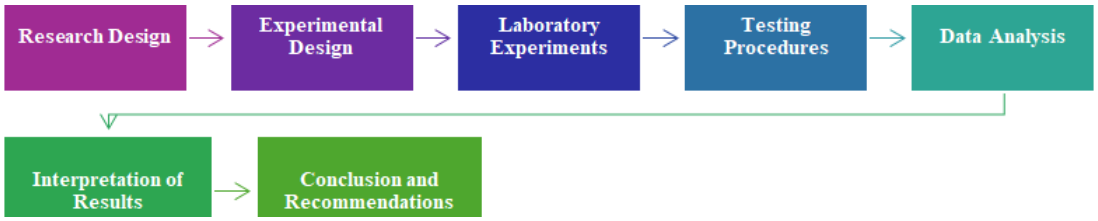
(probably viscose), and polyester content of 20 grams per brick can increase compressive strength by up to 45%, while reducing water absorption. However, increasing the quantity of fabrics decreases strength compared to initial results.

Chiara Rubino, Stefania Liuzzi (2018) Collecting textile waste without recycling can pose a serious environmental threat. However, repurposing these leftover materials into new building materials offers a solution to pollution and helps conserve natural resources for future generations. This study explores various types of textile construction materials and their properties.

Textile fibers can be utilized to create sustainable thermal and acoustic insulators in the form of mats or panels, energy-efficient bricks, and innovative concrete or plaster mortar. Compared to conventional building materials, textile materials exhibit higher thermal efficiency and acoustic performance. Additionally, textile fibers enhance the mechanical properties of plaster mortars.

II. METHODOLOGY



III. OBJECTIVES

Determine the impact of incorporating varying ratios of cotton thread into cement brick compositions on their structural properties, specifically focusing on tensile strength, flexibility, and durability.

Investigate the thermal insulation capabilities of cotton thread-reinforced cement bricks in comparison to traditional bricks, assessing how the addition of cotton thread affects the thermal conductivity and overall energy efficiency of the bricks.

Evaluate the economic feasibility and environmental sustainability of cotton thread reinforcement in cement brick production by analysing the material costs, manufacturing process efficiency, and ecological footprint, aiming to provide insights into the viability and practicality of implementing this innovation on a larger scale within the construction industry.

Fig 1: Waste Clothes

Fig 2: Separated Thread

Fig 3: Mixing Process

Fig 4: Mixed Mortar

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IV. RESULT

Results of Compressive Strengths after 7, 14, 28 days of curing

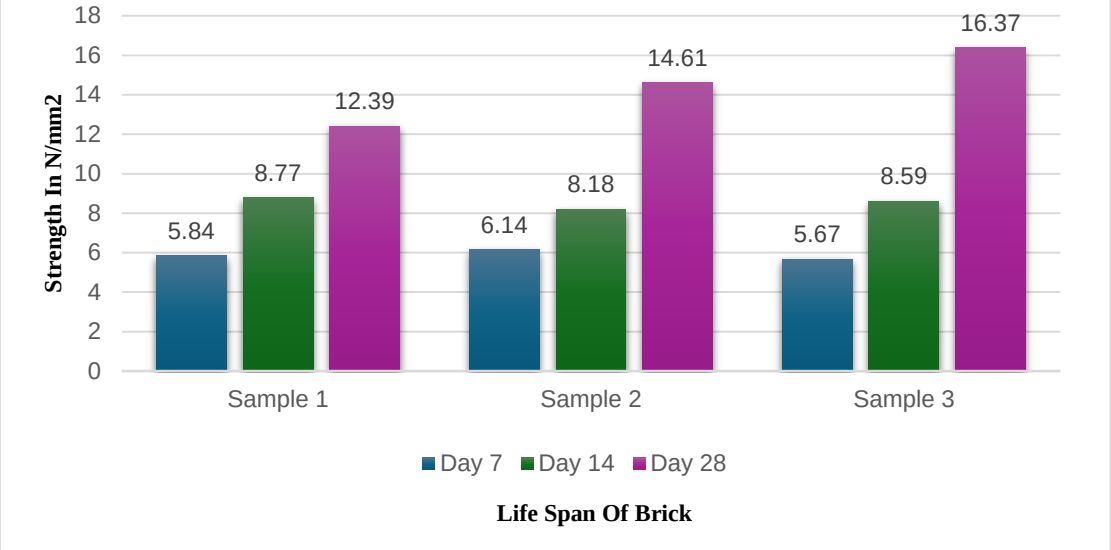

Fig 5:

V. DISCUSSION

Our project focused on integrating cotton thread as an admixture in brick production to enhance structural strength, durability, and sustainability. Through experimentation, we
observed significant improvements in flexural and tensile strength, with cotton thread-reinforced bricks exhibiting 8.5 N/mm^2 and 4.0 N/mm^2, respectively, compared to 6.0 N/mm^2 and 2.5 N/mm^2 for conventional bricks. These enhancements reduce the risk of cracking and deformation, prolonging the lifespan of structures. Additionally, the bricks demonstrated superior durability, resisting weathering and environmental degradation, while promoting sustainability by reducing carbon emissions and energy consumption. From a cost perspective, the use of cotton thread proved economically viable, with comparable or lower production costs and long-term savings due to reduced maintenance requirements. Overall, our project highlights the potential of cotton thread-reinforced bricks to revolutionize construction practices, offering a sustainable and cost-effective solution for building materials.

VI. CONCLUSION

The cotton thread brick innovation represents a significant leap forward in construction materials technology. By incorporating cotton thread into brick production, we have achieved remarkable enhancements in structural strength, durability, and sustainability.
These innovative bricks offer architects and builders a versatile and eco-friendly solution, providing improved mechanical properties while reducing environmental impact. As we continue to refine and expand upon this innovation, the cotton thread brick stands poised to revolutionize construction practices, paving the way for a more resilient, sustainable, and cost-effective built environment.

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