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Literature Survey and Study on Steel-Fibred Lime Brick and Their Application on Environment

Post Graduate student Reshma P. D., Associate Professor V. Murugesh
Department of Civil Engineering,
JCT College of Engineering and Technology, Coimbatore, Tamilnadu, India

***Abstract*- Short and randomly distributed steel fibres are often used for making bricks &concrete reinforcement since they offer resistance to crack initiation and, mainly, to crack propogation.In steel fibre reinforced concrete of low fibre volume content, the fibre reinforcement effectiveness is only significant after matrix cracking, since fibres crossing the crack guarantee a certain level of stress transfer between the faces of the crack, providing to the concrete a residual strength, the magnitude of which depends on the fibre, matrix and fibre-matrix properties.Lime brick is a product that uses lime instead of cement. It is usually a white brick made of lime and selected quarry dust, cast in molds and cured. These bricks are good acoustic insulation, good heat and & humidity as well as excellent fire resistance.**

***Keywords*- steel fibre, lime bricks, quarry dust, steel fibre reinforced concrete.**

I. INTRODUCTION

Bricks were amongst the first artificial materials produced by human beings for building purposes that proved to be easy to produce, resistant, and durable. Clay brick is one of the oldest building materials and has been used since the early civilizations. It is a kind of crystalline ceramic and is among the most common construction materials found all over the world. Due to the non-availability of clayey soil, it has been replaced by lime mortar in addition with steel fibre. Steel fibre is one of the major waste product from steel industries, hence this waste material can be reused again.When steel fibres are added to lime mortar brick, the strength is increased from 25% to35% - depending on the proportion of fibres added and the mix design.Steel fibre technology actually transforms a brittle material into a stronger one. Steel fibred bricks exhibits higher durability, better crack resistance, improved fatigue strength, higher resistance to spalling, and higher firstcrack strength.

II. LITERATURE REVIEW

Piotr Matysek (1) studied on the Compressive Strength of Bricks from Different Historical Periods. From this paper it is concluded that with increase in soil percentage, strength of bricks go down and a graph is plotted against different compressive strength of bricks in different historical periods.

Dhaval M. Vaviya (2) explained about comparing clay bricks monograms with fly ash bricks.The results shows the Fly-ash bricks are more safe, economical and having higher strength compare to conventional bricks.

Abhijeet D Pati (3) studied about the Compressed Stabilized Earth Blocks by using lime. It is concluded that Due to maximum lime content Maximum dry density will also increases.

Yashpal(4) studied about Compressive Strength of Brick with Partial Replacement of Fly Ash. Clay fly Ash burnt bricks can be extensively used in all building constructional activities similar to that of common burnt clay bricks. The clay fly ash burnt bricks are comparatively lighter in weight and stronger than common clay bricks.The compressive strength of Fly ash brick increases as the percentage of fly ash added. Increase in compressive strength for 5 % to 40% of fly ash in clay bricks are 4.92, 5.085, 5.255, 5.85, 5.95, 6.68, 6.85, 8.58 (N/mm2. The % of water absorption for different samples lies between 14.99 – 18.47% when increase in % of fly ash in Clay burnt bricks Water absorption % also increases. Fly ash bricks are lighter in weight and more compressive strength. At 40% Adding of fly ash shows more compressive strength in all the samples having compressive strength 8.58 (N/mm2. At increase in 40 % fly ash in bricks its shows 91.84 % more compressive strength than clay burnt bricks. By using Neuro intelligence a model is developed which shows similar results as observed.

Hamid Pesaran Behbahani (5)explains that one of the undesirable characteristics of the concrete as a brittle material is its low tensile strength, and strain capacity. Therefore it requires reinforcement in order to be used as the most widely construction material. Conventionally, this reinforcement is in the form of continuous steel bars placed in the concrete structure in the appropriate positions to withstand the imposed tensile and shear stress. This paper presents an overview of the mechanical properties of Steel Fiber Reinforced Concrete(SFRC), its

advantages, and its applications. During the last decade's incredible development have been made in concrete technology. One of the major progresses is Fibre Reinforced Concrete (FRC) which can be defined as a composite material consisting of conventional concrete reinforced by the random dispersal of short, discontinious, and discrete fine fibres of specific geometry. Unlike conventional reinforcing steel bars, which are specifically designed and placed in the tensile zone of the concrete member, fibers are thin, short and distributed randomly throughout the concrete member. Among all kinds of fibers which can be used as concrete reinforcement, Steel Fibers are the most popular one. The performance of the Steel Fiber Reinforced Concrete (SFRC) has shown a significant improvement in flexural strength and overall toughness compared against Conventional Reinforced Concrete.

A.A. Raheem (6) This paper reports the results of a comparative study of cement and lime stabilized lateritic interlocking blocks produced with laterite samples from the Olomi area in Ogbomoso, Oyo State, Nigeria. Cement stabilized block is of better quality in terms of compressive strength, water absorption and durability than those stabilized with lime.10% cement stabilization is recommended for lateritic interlocking blocks in other to meet the minimum standards as stated by the available codes.Cement interlocking block is cheaper than lime interlocking block.

Mohammad shahid (7) explains about the various engineering tests are conducted on the material i.e. clay such as moisture content, liquid limit, plastic limit, plasticity index, shrinkage limit, shrinkage ratio and volumetric shrinkage ratio. Similarly, the moisture content of paper mill waste is also carried out and it is found to be approximately 60%. The details of test results are shown in the Table 2.The samples of brick each from orange peels and coconut waste of varying compositions were used for conducting the compressive strength tests. The test results shown in Table 3 indicate that the bricks confirm to the minimum compressive strength requirements stipulated in IS 1077:1992 but the bricks prepared from the coconut waste are more efficient than orange peels.

G.VinothKanna(8)it is observed that during different industrial, mining, agricultural and domestic activities, huge quantity of solid wastes are being generated as by-products, which pose major environmental problems as well as occupy a large area of lands fortheir storage/disposal. There is a tremendous scope for setting up secondary industries for recycling and using such huge quantity of solid wastes as minerals or resources in the production of construction materials. Environment-friendly, energy-efficient, and cost-effective alternative materials produced from solid wastes will show a good market potential to fulfill people's needs in rural and urban areas. An incorporation of industrial wastes or sub-products in bricks is becoming a common practice. Quarry processing industry generates a large amount of wastes, which pollute and damage the environment. Therefore this work aims to characterize and evaluate the possibilities of using the coconut fiber, generated by the process industries, as alternative raw materials in the production of bricks.The waste can be reused as a fully replacement of clay with respect to the physical characteristics. Fully solid waste bricks yield to degrade mechanical, in terms of compressive strength, and physical, in terms ofwater absorption, properties. According to IS specifications the water absorption values must lower than 20%. The fully solid waste brick shows the negative effect.There is a positive effect of river sand & coconut fiber partially on clay brick samples that reach its optimum at 50% clay, 35% river sand and 15% coconut fiber by weight can be incorporated into raw clay materials of brick chambers, without degrading their mechanical properties. Finally, coconut fiber as an alternative raw material in brick production will induce a relief on waste disposal concerns. Further, the incorporation of coconut fiber in brick production leads to a new method of wastes disposal and found to be an environmental eco-friendly recycling process in brick industries and alsopreserve the 50% clay material.

S. Lakshman Teja (9) In this research we learnt about the stabilization of soils with admixtures like lime, iron dust, quarry dust.,etc. We find out the ways how to come over the obstacles faced during the project. In view of our past research we found different ways to stabilize the soils using admixtures.The stability and bearing power of the soil is considerably improved by soil stabilization through controlled compaction, proportioning and the addition of suitable admixtures. Swelling soil is not suitable for the construction work on account of its volumetric changes. It swells and shrinks excessively with change of water content. Such tendency of soil is due to the presence of fine clay particles which swell, when they come in contact with water, resulting in alternate swelling and shrinking of soil due to which differential settlement of structure takes place. Stabilization of black cotton soil has been done in this project work by using brick dust as admixture.The object of our present studies is to improve the various properties of black cotton soil by mixing brick dust which is easily available locally.

Abhijeet D. Patil (10) explained about Compressed Stabilized Earth Blocks by using Lime due to maximum lime content maximum dry densitywill also increases. Theblock density increases with increase in limecontent,and itvaries with aeon.Asexpected, by increasing lime content,compressive strengthalsoincreases; aftercompleting the curing of 7 days, it gives 80 % strength.The compressive strength increase by blending stone dust in to soil also applicabledemeanourwasalso improved; though it

decreased the block density.By using local resources, experimental investigation and feasibility study on CSEBshould be done.For 10 % limecontent,0.5 percent and 1.0 percent increased the compressive strength by 60.54 percent, 95.92 percent and115.30 percent respectively.As discussed earlier the optimum lime content is that which gives maximum strength at low cost which is taken as 10%.It doesn't satisfy the BIS recommendations. But then also it isthe most economical option.

T. Ritchie (11) explained about Brick Durability Tests and the Method of Freezing. It results the brick durability tests and the Method of Freezing.

Aeslina Abdul Kadir (12) studied about Bricks: an excellent building material for recycling wastes. It concluded thatthe manufactured bricks with different types of waste have shown positive effects on the properties of fired clay bricks such as improved porosity, thermal conductivity, water absorption properties, and reduction of density and energy used during firing.

V.Jayanthi (13) studied about Experimental Studies on Reinforced Brick. It concluded that the addition of steel scrap increases the compressive strength and decreases the water absorption rate when compared with conventional brick.

S.V. GiriBabu (14) studied about Manufacturing of Eco-Friendly Brick. From the above researches that various types of waste materials from the different industries have been used in different proportions and different methods are adopted to produce bricks.

III. SUMMARY OF LITERATURE REVIEW

When steel fibers of 0.2% to 1% are added to lime mortar, the strength of brick is increased from 25% to 35%-depending on the proportion of fibres added and the mix design. Steel fibre technology actually transforms a brittle material into a stronger one. This lime mortar bricks with steel fibre is extra soft and versatile, perfect for the conservation of gentle masonry. Steel fibre can also be used in concrete order to increase the strength of concrete.Usage of steel fibre in lime mortar brick will increase the durability.

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