

## Ferrocete Technology Best for Conventional Technology

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**Abstract** –In this present developing country fast life, is experiencing huge population growth in cities due to rapid modernization, urbanization in metropolitan crowded cities. People are in need of peace of mind that creates the need houses and bungalows admeasuring the plot /land of area about 1000 to 5000 sqm. According to their needs and utilities houses and bungalows can be constructed and the customary building construction trend of usually focuses use of brunt clay bricks and reinforced cement concrete which is large extent proves they uneconomic. Provided using ferrocete as best suited building technology as compare to the conventional technology.

Ferrocement, which is versatile, light weight thin material and involves easy labour emerging as an effective building material in construction industry. This paper illustrates the diversified use of ferrocete technology and eliminates the conventional technology. Several project demonstrated here with prominence to diverse ferrocement element serving both structural-non structural components of building and serves esthetic purpose as well. Aim of the study to explore the versatility using ferrocete technology in construction replaces conventional technology.

**Keywords:** *Ferrocement, FC Application, Construction Technique, Versatile Material.*

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### I. INTRODUCTION

At the time ferrocement was seen as means to help developing countries improve their low cost in construction facilities such as housing, agriculture building and marine structure. Ferrocement is the thin element cementitious composite material and modified form reinforced cement concrete with elimination of formwork to avoid the usage of coarse aggregates, steel, burnt clay bricks and reduced the cost of construction.

Ferrocement is being realized as an effective as compare to the conventional technology. Ferrocement That is deferrers' form of conventional reinforced or prestressed concrete primarily by the manner in which the reinforcing element are dispersed and arrange. It consist of closely spaced, multiple layers of mesh or fine rods completely embedded in cement mortar. A composite material is formed that actsdifferently from conventional technology in strength, deformation and potential applications.

Architectural flexibility is one of the main priorities considered in sustainable housing, along with energy efficiency, occupants, comfort .

Ferrocement as materials strong durable crack resistant, waterproof, fire resistant, energy absorption , highly ductile, disaster resistance, pollution resistance , environmental friendly most suitable for precasting, along with cast-in-situ construction.

### II. LITERATURE REVIEW

#### A. *P Paramasivam 2001*

Described the research and development works on ferrocement application , at the national university of Singapore, since early 1970's has a resulted in several application such as sunscreen , secondary roofing slabs, water tanks, repair material in the building industries.

Ferrocement is ideally suited for thin wall structures as the uniform distribution and dispersion of reinforcement provide better cracking resistance , higher tensile strength to weight ratio, ductility and impact resistance. By adapting available mechanized production method and proper choice of reinforcement it can be cost competitive in industrialized countries.

#### B. *Hani h. Nassif 2004*

The use of cementitious composites for infrastructure application is becoming more popular with the introduction of new high performance material. Ferrocement laminates are introduced of new high performance materials. Ferrocement laminates are introduced to enhance the overall performance of structure, such as composite bridge, decks, bearing wall, etc. this paper present lightweight truss roofing system. Earthquake resistance is ensured by analyzing the structure on ETABS for a seismic activity of zone 4. The behavior of structure is found satisfactory under the earthquake loading. An estimate of cost is also presented which shows that it is an economical solution.

#### C. *Jagannathan and sakhivel*

Emphasiezed on the importance of using ferrocete construction technology is quite popular throughout the world. Ferrocement a thin element is used as building construction as well as a repair material. This paper attempts to review the literature on ferrocement and bring out the silent features of construction, material properties and the special technique of applying cement mortar on to the reinforcing mesh. This study bring out the imporatance of using ferrocement in swimming pools and water tanks, silos, corrugated roofs, shell, and dome structure and also repair of old deteriorated RCC structure. Also is discussed in this similar material to ferrocement , termed as engineered cementitious composite, which is use fibers as reinforcement.

The recommendation of this study includes addition of fibers in ferrocement to reduce crack-width. The present authors recommend that experimental investigation may be

conducted on new reinforcing materials by reinforcing material by researchers in the future. The study concludes that ferrocement will certainly be one of the best structural alternatives for RCC in the future.

*D. M. A. Saleem 2008*

According to the M. A. Saleem 2008 says the greatest humanitarian challenge faced even today after one year of Kashmir hazara earthquake is that of providing shelter. Currently on the globe one in seven people live in slum or refugee camp [1]. The earthquake of October 2005 resulted in great loss of life and property. This research work focused on developing a design of small size low cost and earthquake resistant house. ferrocement panels are recommended as the main structural elements with mixture of portland cement and sand applied over layers of woven or expanded steel mesh and closely spaced small diameter steel rods rebar. It can be used to form relatively thin , compounds curved sheets to make for boats, shell, roofs, water tanks, etc ferrocement is also written as a ferrocimento, ferrocrete.

Ferrocement is a highly versatile form of reinforced concrete, constructed of hydraulic cement mortar reinforced with closely spaced layers of continuous and relatively small diameter wire mesh. The mesh may be made up of a metallic or other suitable material. Ferrocement primarily differs from conventional reinforced or prestressed concrete by the manner in which the reinforced elements are dispersed arranged.

*E. Jaime Arias*

The purpose of this paper is to explore the ferrocement building technique for sustainable housing. Ferrocement involves the use of conventional cement with aggregate and several layers of steel, with the advantage of higher strength than conventional reinforced concrete, limited formwork and thinner section. It is particularly suitable for thin shell structure, where geometry minimizes bending loads. Architectural exibility is one of the main priorities considered in sustainable housing, along with energy efficiency, occupant comfort, resistance to seismic and tornado events, adorability and durability. Ferrocement historical and present application is covered, along with the other building technique, in order to establish best practices and possible improvement. Reducing construction labour is a particular focus, which has limited ferrocement development in recent years.

Computer modeling of shell form binding is described, with three case studies created. a structural analysis method is described and applied to each case study to verify general building code safety. Energy modeling is performed in two climates for each case study in the united states and compared to key passive energy demand limits.

III. OBJECTIVE:

- Elimination of Formwork And Re-Inforcement Placing At Site: Ferrocement plates forming column boxes are manufactured in the factory with most column reinforcement in the thickness of ferrocement about 4cm. thk. In the form of square or rectangle. After curing these are taken to site and erected in position in lengths of one unit each. Cast in situ concrete poured in the hollow and vibrated. These are

taken to site, put on the column and duly connected by welding, wire meshing and matrix. Cast in situ concrete poured in the hollow and vibrated the reinforcement required is placed within the formwork in the factory, thus elimination placing at site

- Ferrocete technology does not require any heavy plants or machinery at construction: ferrocement construction is highly modified form reinforced cement concrete with elimination formwork and coarse aggregate. There is total fabrication of beam, columns, slabs and partially precasting as forwork in the factory. These are taken to site, assembled, balance concreting poured and finished. Labour can handle or cables are also use for handling the element
- The construction is to implement the beauty of ferrocete construction: Architects in practice about the use of ferrocement is one of the flexible solution to develop their ingenious and artistic design. Ferrocement in turns offers smooth, versatile, undulating, flush surfaces. Ferrocement application allows Architect sketchy form of the building to transform into reality without structural deformation. Ferrocement application in Architect design offer freedom to pencil to develop ideas beyond imagination .Architect to say ferrocement as versatile material to expand their skill beyond technical boundry of construction details.
- It does not use maximum size aggregate which give it sustainable: well graded and washed river sand passing 2.36mm IS sieve is most commonly used as fine aggregate in ferrocrete . The maximum size of aggregate depends upon the size of mesh openings and the spacing between the layer mesh. Maximum size of aggregate is avoided sand confirming to the IS 383-197
- The Ferrocete Construction Shall Save Cost Considerably : In ferrocrete technology shall be the more better choice saving cost considerably as compare to the conventional technology is t to strong enough prove that above objective and and effective technique

IV. METHODOLGY :

CONVENTIONAL RCC FRAME STRUCTURE VS FC- ALL IN- IN-ONE METHOD

- In conventional RCC framework method item of construction are interdependent the RCC frame of footing , plinth beams, columns and slabs with floor beams are constructed first and then brickwork is done and then these are plaster later on.
- In ferrocrete technology All-in-one method of FC invented by Dr. B.N. Divekar and constructed first floor of his own house very successfully. All-in-one

method of construction by using ferrocement is use for the first time and unique features.

- Hence All-in-one is 100% eco-friendly method of construction and can earn carbon credits in its use.

#### V. CONCLUSION:

The main study found that the ferrocement construction technology is best for conventional technology compare above some points. Ferrocement technology using lesser amount of materials. Related faster construction process saving time of construction, the site work is reduced to only ten percent. To create various aesthetic shape not possible in RCC construction. All type of structure can be easily constructed by using this method.

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