



## Review Paper on Ferrocement in Construction

Gursewak Dass

SBBSIET

Sant Baba Bhag Singh University

Jalandhar, Punjab, India

gursewak1284078@gmail.com

Mohit Talwar

SBBSU

Sant Baba Bhag Singh University

Jalandhar, Punjab, India

civil.talwarnit@gmail.com

**Abstract—** It had been concluded from this study how ferrocement is better than conventional types RCC, PCC etc and perform good against lateral displacement, fire resistant etc economically without required any skilled worker. On other hand ferrocement is a good alternate material depends upon location of application. This study also shows that the load taken by ferrocement depends upon opening size and the no. of reinforcing mesh layer used in ferrocement.

**Keywords:** Ferrocement, construction, RCC, PCC

## I. INTRODUCTION

Ferrocement is a composite material used to form thin section, it is composed of a mortar, reinforcement include light steel fabrics and meshes.

Ferro cement originated in the 1840 in France and after this a reinforced concrete was invented. Ferro cement cover the wide range of applications due to the low self weight, economic, lack of skilled workers, no need of frame work etc.

It cover series of advantage as compare to reinforced concrete such as :

- i) A wider range of electricity.
- ii) Greater resistance to extension.
- iii) Batter behaviour at dynamic stress.
- iv) Increased value of the breaking effort out of extension.

According to "Shah's published works" The Lambot was the 1<sup>st</sup> small boat constructed with a help of Ferro cement, but now a days there is a wide range of application of Ferro Cement.

Walls constructed with a help of Ferrocement can withstand against 0° temperature to 1700° C and after that the damage to the houses is negligible and can be repaired. The reason behind resistance against fire due to insulating material at the same time having isotropic material. The expansion in Ferrocement due to fire is negligible and no cracking or splitting is occurred & bond being very high. A Ferrocement reinforcing can be done over any temporary frame work in any desired shape and mortar can be applied

over it in upside downword direction. In this we required only semi skilled labours e.g. bar bender.

On other hand a dense matrix in a Ferrocement can be achieved by using fly ash and silicon fume, the strength in Ferrocement can be achieved by the use of different type of wire mesh. All the studies on Ferro cement reported that it has performed well under almost all the loading conditions weather it is tension, compression, flexure, shear, torsion, fatigue, impact or dynamic loading.

On the other hand when we compare Ferrocement with RCC (Reinforced Cement Concrete) it perform better against crack, because wire messes that were used in Ferro cement will cover the macro part of Ferro cement structure and avoid cracking, and is RCC structure there is a possibility of crack due the attack of aggressive chemical like  $Cl-SO_4$

Another study that was conducted by Arif Etial to quantity the effect of wire mesh concluded that the orientation of the wire meshes effect the behavior of the ferrocement.

There is various types of material sued in ferrocement e.g.

- a) Cement mortar mix.
- b) Skelton steel
- c) Steel mesh reinforcement or fiber reinforced polymeric meshes.

Cement mortar matrix constitute 95% of the composite and govern its behavior, sand occupies 60 to 75% of the volume of the mortar and plasticizer and other admixtures are used.

Skelton steel used form the skeleton of the structure with the use of 3 to 8mm steel can be used in tied form or welded wire febric. It should be noted that the reinforcement should be free from dust, rust and other impurities.

Steel mesh reinforcement consist of galvanized steel wire of diameter 0.5 to 1.5 mm spaced at 6 to 20mm centre to centre.

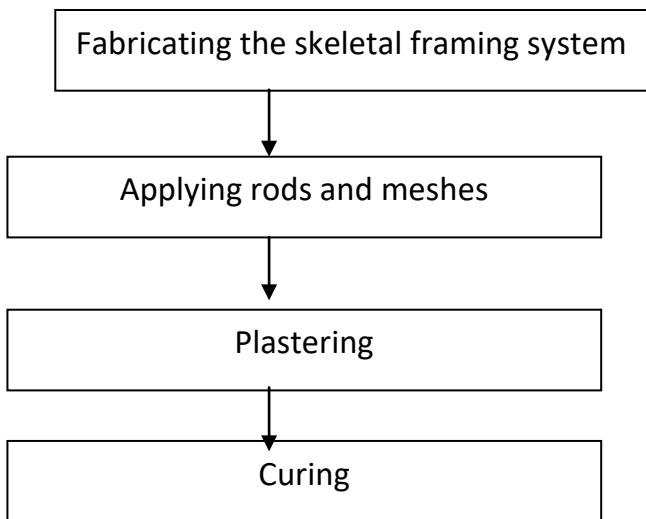
II. PROPERTIES OF FERROCEMENT

Ferrocement is a type of a reinforced concrete having large amount of smaller diameter wire meshes are needed, these wires are metal wire and sometimes other type of suitable material can be used sand, cement, mortar mix and quantity of reinforcing material decide the strength of ferrocement.

CONSTITUENT OF FERRO CEMENT

- 1) Cement
- 2) Fire Aggregate
- 3) Water
- 4) Admixture
- 5) Mortar Mix
- 6) Reinforcing mesh
- 7) Skeletal steel
- 8) Coating

PROCESS OF FERRO CEMENT CONSTRUCTION



APPLICATIONS OF FERROCEMENT IN CONSTRUCTION

- 1) Housing and other Industrial and commercial.
  - a) Low cost dwelling house
  - b) Strengthening reinforced concrete element.
  - c) Strengthening masonry element.
- 2) Marine
- 3) Agricultural
- 4) Anti corrosive Membrane treatment
- 5) Tank container & silos
- 6) Floor & Roof
- 7) Waterproofing
- 8) Manhole cover
- 9) Wall cupboard
- 10) Ferrocement duct
- 11) Chemical resistant treatment
- 12) Rural Application
- 13) Elevation Treatment

- 14) Fire resistant structure
- 15) Soil stabilization
- 16) Pipes
- 17) Sewer lines
- 18) Bridge
- 19) Foot Bridge
- 20) Sulphate resistant cement saving
- 21) Precast ferrocement structure

III. HOUSING

a) Low cost dwelling house  
 The good properties of Ferrocement e.g. high tensile strength/ weight ratio, unskilled worker requirement, roofs with less dead load make it an interesting solution for a housing propose.

There is good properties of Ferrocement against.

- a) Cyclic loading
  - b) Lateral displacement
  - c) Resistance to earthquake loading.
- b) Strengthening of structural element  
 Ferrocement is a best alternative for retrofit recent studies use this material as a retrofit for beams, column, beam column connection and give better result.
- c) Strengthening reinforced concrete element  
 Ferrocement is applicable to provide extra confinement to achieve good axial capacity of column without considering the grade of concrete.
- d) Strengthening masonry element.  
 On other hand Ferro cement is also applicable for strengthening masonry column with Ferrocement jacketing same as above mentioned in RCC column, in masonry column by using Ferrocement also improve the crack behaviour and compressive strength of masonry column.

2. MARINE:-  
 Marine structure such as Boat, trawler, Barges, floating docs can be constructed with a help of Ferrocement and give better result than steel and wood and a good resistance of atmosphere.

3. AGRICULTURAL:-  
 The plates that are construct with a help of ferrocement can be used for:-

- i) Construction of canal.
- ii) Gates over dam
- iii) Cross-drainage work
- iv) Aqua-duct
- v) Penstocks etc

Ferrocement lining is good against abrasion.

4. ANTI CORROSIVE MEMBRANE TREATMENT:-  
 A Ferro cement consist anti-corrosive membrane treatment hence no other treatment is required for protection against corrosion.

#### 5. TANK CONTAINER AND SILOS:-

Every type of tank e.g. overhead, underground or at ground level can be manufactured with the help of Ferrocement and give a satisfactory service.

#### 6. FLOOR AND ROOF

We can construct floor & roof various type of building e.g. residence, factories, office, sheds etc.

#### 7. WATER PROFFING

By using Ferrocement membrane technique we can construct water proofing.

#### 8. MANHOLE COVER:-

Heavy duty and light duty manhole cover be constructed and are superior and durable than conventional once.

#### 9. WALL CUPBOARD:-

It consist no. of small holes in rectangular form with or without shutter used to store office record, factory material etc.

#### 10. FERROCEMENT DUCT:-

Ferro Cement ducts are suitable for circulation of cool or hot air.

#### 11. CHEMICAL RESISTANT TREATMENT:-

An overly of epoxy, bitumen, polyurethane, chlorinated rubber, lead lining and glass fibre will be an ideal chemical resistant treatment

#### 12. RURAL APPLICATION

Ferrocement is applicable in rural areas for construction of cattle sheds, silos for storage of food grains. Low costs houses, community centres, well lining, gobar gas plant, lavatory block, water storage tank etc.

#### 13. ELEVATION TREATMENT:-

Elevation treatment e.g. fins, projection curved, folded and hollow, sun shed to the building have been provided with advantages.

#### 14. FIRE RESISTANT STRUCTURE:-

It can resist fire upon 750° for a period of 48 hours.

#### 15. SOIL STABLIZATION:-

Ferrocement can be used for increase bearing capacity of soil for foundation of building, bridge, dams etc.

#### 16. PIPES:-

There is corrosion problem using steel and iron pipes instead of these wire ferrocement pipes overcome the problem of corrosion.

#### 17. SEWER LINES:-

Ferrocement in sewer line is necessary same as pipes.

#### 18. BRIDGE:-

As per know Ferro cement is crack resistance and corrosion resistance and applicable to make girder plates.

#### 19. FOOT BRIDGE:-

Foot bridge with Ferrocement girder, decking, railing and roof is better than RCC and steel

#### 20. SULPHATE RESISTANT CEMENT SAVING

During conventional concrete curing by using sulphate resistant ferrocement lining very cost effective and structure is safe against salphate attack.

#### 21. PRE-CAST FERROCEMENT STRUCTURE:-

Pre-cast ferrocement structure are in light weight as compared with RCC and sometime pre stressed concrete structure, considerably reduce the cost hence ferrocement is most appropriate in pre-cast industry.

### IV. CONCLUSION

Ferrocement is a good material. Further modification in ferrocement can make it best materials in structure as compared to RCC or other type of material and also ferrocement is economical in nature and having a good performance against lateral load.

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