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A REVIEW PAPER ON TEMPLE BY USING FERROCEMENT TECHNOLOGY

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ABSTRACT

Ferrocementconstruction technology is most popular throughout the world.Ferrocement, a thin element, is used as a building construction as well as a repair material and it is also used for application including construction of boats, water tanks, slabs and roofs, and lining of tunnels. Ferrocement have properties such as high strength/weight ratio and good resistance to cracking. New applications have been developed in the recent years, such as low cost housing buildings and wide variety of structural elements. Ferrocement is a concrete which differs from other concrete. It consists of closely spaced with multiple layers of mesh or fine rods or steel bars which is completely embedded in cement mortar. It can be formed into thin panels or sections, mostly 25 mm thick or above according to design or construction of structure. In ferrocement we design in required shape and the mortar can be plastered directly in place without the use of a formwork.

Keywords*: Reinforced concrete , Ferrocement Temple, Ferrocement.*

I. INTRODUCTION

The term ferrocement that means combination of reinforcement embedded in concrete which includes sand and cement and water. Ferrocement is a thin construction procedure with thickness in the order of 10-25 mm and uses of cement mortar , no coarse aggregate is used and with net formation of reinforcement and chicken mesh . It does not requires any skilled labour and any type of formwork. Ferrocementstructure involving easy and reliable technology, which giving architectural expression or architectural views and structural beauty. Ferrocement construction technology is being popularized throughout the world in countries like Canada, USA, Australia, New Zealand, United Kingdom, Mexico, Brazil, the former USSR, Eastern European countries, China, Thailand, India, Indonesia, and in other developing countries due to its uniqueness and versality.Ferrocement is being explored as building materials substituting stone, brick, RCC, steel, prestressed concrete and timber and also as structural components—walls, floors, roofs, beams, columns and slabs, water and soil retaining wall structures; other applications include window and door frames and shutters. Ferrocement can be fabricated into any desired shape or structural configuration that is generally not possible with standard masonry, RCC or steel.There are many structures built of ferrocement--housing units, shell roofs, water tanks and swimming pools, biogas digesters, silos, food storage units, and for some specialized applications such as floating marine structures for which reinforced concrete is too heavy.

II. CONSTITUENTS

Cement

Ordinary Portland cement (OPC) is generally used in ferrocement. we selected the Birla cement (53 grade) But the type of cement should be selected according to the need or environment in which the structure is built. Birla cement achieve strength erlier and increasing speed of construction. This product is hightly durable due to low percentage of alkines , chlorides , mangnesia and free lime. Also it reduces steel consumption upto 10%. Ideally the cement will be no more then three weeks old.

Aggregate

Only fine aggregate is used in ferrocement. Coarse aggregate is not used. Normally, the aggregate consists of well graded fine aggregate (sand) that passes through 2.36 mm sieve. The importance of good , clean and well graded sand provided is to form a good concrete.

Water
Mixing of water should be according to requirements. In ferrocement, the water used for mixing cement mortar should be fresh and clean.

Steel
According to requirement we provide steel with different diameters and grades. Steel is provided alternately to hold the chicken mesh. And also can stand with mortor application.

Chicken Mesh
It is formed by twisting two adjacent wires at least four times which forming strong honeycomb mesh structure. It made up with galvanized low carbon wire and distance between faces of hexagonal is from 13 to 50 mm. Having diameter about 0.6 to 2 mm.

III. CONSTRUCTION METHODS

All methods shall have high level quality control criteria.The most appropriate fabrication technique shall be decide d on the basis of the nature of the particular ferrocement application, the availability of mixing, handling, and placin g machinery, and the skill and cost of available labour.Several recommended construction methods are outlined in th e following subsections.

Armature mould system
The armature system is a framework of tied reinforcing bars (skeletal steel) to which layers of reinforcing mesh are attached on each side. Mortar is then applied from one side and forced through the mesh layers towards the other side.

The skeletal steel can assume any shape. Diameter of the steel bars depends on the size of the structure.

Skeletalsteel shall be cut to specified lengths, bent to the proper profile, and tied in proper sequence. Sufficient embe dment lengths shall be provided to ensure continuity. For bar sizes 6 mm or less, lap lengths from 230 to 300 mm m ay be sufficient. The required number of layers of mesh shall be tied to each side of the skeletal steel frame.

Closed mould system
The mortar is applied from one side through several layers of mesh or mesh and rod combinations that have been stapled or otherwise held in position against the surface of a closed mould, i.e. a male mould or a female mould. The mould may remain as a permanent part of the finished ferrocement structure. If removed, treatment with release agents may be needed.

Integral mould system
An integral mould is first constructed by application of mortar from one or two sides on to a semi rigid framework made with a minimum number of mesh layers. This forms, after mortar setting, a rigid but low quality ferrocement mould onto which further layer of reinforcing mesh and mortar shall be applied on both sides. Alternatively, the integral mould may be formed using rigid insulation materials, such as polystyrene or polyurethane, as the core.

Open-mould System
In the openmould system, mortar is applied from one side through layers of mesh or mesh and rods attached to an open mould made of a lattice of wood strips.This system is similar to the closedmould system in which the mo tar is applied from one side, at least until the mould can be removed. It enables at least part of the underside of the mould to be viewed and repaired, where necessary, to ensure complete and thorough impregnation of the mesh.

IV. CONSTRUCTION PROCESS

Construction sequencing/ process is important for ferrocement construction. Since the ferrocement elements are very thin in the order of 10-25 mm , considerable care is to be taken to maintain minimum cover of 3 mm.

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Tying of Reinforcement

As per the design requirements, one or more layers of chicken or wire mesh reinforcement are decided. Binding wires are used with properly cut and bent. It is necessary that the chicken mesh and steel is laid evenly and tied to each other.

Design of Cement Mortar

The composition of the cement, aggregate (sand) and the water-cement ratio are the major factors which is plays important role while application. The mortar is designed for its appropriate strength and maximum densenes and impermeability, with sufficient workability tominimise voids and to avoid cracking. Cement mortar used in ferrocement acts as a good insulator and the reinforcing wire mesh can reduce surface spalling better than plain concrete. Precautions are necessary to maintain the small cover and in selection of aggregates, mixing, placing and curing. The cement mortar should be mixed with proper sand-cement ratio ranging from 1:2 to 1:3. Admixtures or additives may be added to improve the performance of the cement mortar, depending upon the type of structures.

Mortar Application

In ferrocement construction, mortar plastering is main role. The mortar is apply in the mesh reinforcement either by hand or shotcreting. In order to assure that mesh do not open out, a thin mortar cover layer is placed first and allowed to set, but not dry completely, prior to application of a second mortar layer and the first mesh layers. This first layer of mortar cover is generally about 3 mm thick. A major advantage of the lay-up technique is that each layer of mesh is placed under full visual contact; any gap in the mortar is immediately apparent and instantly corrected. But the edges of ferrocement which are normally pressed by hand to get the correct proper finishing.

Curing

Proper curing is necessary to develop the required properties of the mortar.To avoid crack formation water can spread over the structure.

V. ADVANTAGES

No need of formwork , easy to construction , cost of construction is low , can be constructed in any shape , no skilled labours required , less shrinkage , low weight , good appearance, long life structure, undergo large deformations before cracking or high deflections ,providing resistance to fire and corrosion.

VI. DISADVANTAGES

Rusting of steel components if air voids are remains , steel and mesh net formation take time , number of labours are required .

VI. APPLICATIONS

Wall construction , water tank construction , chimey construction , seating bench , manholes , water proofing , irrigation structures , elevation treatment , fire resistance structures , pipes , sewer lines , wall cupboards , etc.

VII.SUMMARY

The future of ferrocement will depend as much upon design creativity as it will depend upon long and laborious research efforts. It is important to recognize that ferrocement, like other fiber reinforced concrete, enables design for a range of tensile stresses and strains in the composite far beyond the ranges previously permitted. This feature, combined with the absence of a thick cover requirement over the reinforcement, provides great flexibility in designing roofs, walls, liquid containers, and precast architectural forms that could provide factory-finish surfaces for members that are cast in the field.

VIII. CONCLUSION

This study offerrocement is an innovative material and the ready availability of materials and easy to construction. Ferrocement is found to be a suitable material for repairing or reshaping. As the performance of ferrocement is greatly dependent on the characteristics of the reinforcing mesh, there is a need to determine and specify an optimum range of properties for the mesh, such as wire spacing, wire diameter, and the characteristics of the mesh

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system. Ferrocement is an optimum low-cost material. The study concludes that ferrocement will certainly be one of the best structural alternatives for RCC in the future.

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