

Construction Method of Floating Ferrocement Platform

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Abstract: This paper reviewed the detailed study of Ferrocement Technology, their composition, material and method for fabrication of ferrocement structure. Ferrocement is the structure resulting from hardening of cement mortar reinforced with steel wires spaced closely together. This report gives idea about fabrication of ferrocement structure used for the floating station in a reservoir.

Keywords: Ferrocement construction, ferrocement, floating concrete, barges.

1. Introduction

Ferrocement is a compound of iron and cement mortar. Ferrocement is a type of thin-wall obtained from hardening of cement mortar construction in which small diameter wire meshes are used uniformly throughout instead of discreetly placed reinforcing bars and in which the mortar is portland cement use instead of concrete. For reinforced concrete, the wire meshes are filled with cement mortar.

A wide variety of structural elements can be produced using ferrocement. Can be used for foundation, wall, floor, roof, shell, etc. They are thin walled, it is light, durable and highly impenetrable. Combines features It is a thin and strong steel material. In addition to this formatting and Shutter for casting. Ferrocement is used in all fields of civil engineering and water-related constructions. Earth support structures, building members, large spatial structures, Bridges, domes, dams, boats, canals, shelters, silos, water treatment plants, Municipal sewage

Materials used in ferrocement structures:

- a) Skeletal steel.
- b) Wire meshes.
- c) Cement mortar.

Advantages of Ferrocement:

- Ferrocement is lightweight material and can also be used for the floating barges and flatforms.
- Ferrocement can be easily casted into any shape and size.
- Can be cast without shuttering.
- Avoids surface cracks.
- Bond between the steel and concrete increases due to increase in the contact surface area.
- Ferrocement is a homogeneous material.

Mooring Analysis of Ferrocement Platform:

A mooring made up of a flexible cable that is tighten and connected to the water body's floor by a weight or anchor and suspended from the sea surface by a buoy.

A mooring system consists of a floating body, which is connected to the sea/Water buoys floor by a system of lines that provide resisting forces against external loads.

2. Literature Review

K. Sasiikalaa and R. Malathy (November 2012). This paper focused on materials, advantages, mechanical properties, practical design parameters, recommendation, research and development in ferrocement.

S. R. Suryawanshi (Apr. 2018). Experimental Studies on Ferrocement, this study deals with technical parameters regarding the loads and deflection over an effective span by using ferrocement and self-compacting mortar (SCM) with varied w/c ratio, mix design criteria and materials which will help to overcome the difficulties and problems in construction.

Ezzat H. Fahmy, Yousry B. I. Shaheen, Ahmed Mahdy Abdelnaby & Mohamed N. Abou Zeid (March 2014). Applying the ferrocement concept in construction of concrete beams incorporating reinforced mortar permanent forms. This paper presents the results of an investigation aimed at developing reinforced concrete beams consisting of precast permanent U-shaped reinforced mortar forms filled with different types of core materials to be used as a viable alternative to the conventional reinforced concrete beam.

3. Methodology

A. Ferrocement Floating Platform Fabrication

Big floating structures are normally fabricated on a levelled surface closer to the water body or on a floating mold where the site confirms sufficient water depth. A ferrocement structure is formed by fabricating the mesh reinforcement to the required shape and size of the structure then cement mortared is poured and the platform is left for the setting and curing. Common steps which are used in fabrication of the ferrocement platform are mentioned below.

1) Construction of bottom panel

Bottom layer 30-35mm thick consist of one layer of expanded metal, two layer of welded mesh and one layer of

8mm tore steel placed between the welded mesh at every one-meter distance both ways.

- Spreading of mortar of 1:2 cement sand ratio (Volumetric) in 6 mm thickness by manually or by a sprayer equipment.
- Place one layer of expanded metal and again spraying of mortar to cover the expanded metal.
- Place one layer of welded mesh over the mortar then apply 3 to 5mm mortar over the mesh, welded mesh should be partially visible and place sufficient weights over the bulged locations.
- Place 8mm tore steel over the welded mesh every 1 meter in both directions. Binding wire should be used for tying the tore steel.
- Place one layer of welded mesh over the 8mm tore by using binding wire. Provide extra welded mesh for the vertical connections along with and apply the mortar.
- Note: Extra welded meshes to be provided for the continuation of the side panels and bulk heads.

2) Side walls and internals

Side panels 30mm thickness consist of one layer expanded metal outside, one layer of welded mesh, one layer of 8mm tore in vertical diction wherever the internals joint's location and one layer of welded mesh. Internal vertical elements are known as bulk heads. There are two types of bulk heads

- Solid bulk heads 25mm thick– are provided for dividing the whole hull in to several water tight compartments. Solid bulk heads will not allow the water to travel from one compartment to the other.
- Hollow bulk heads 25mm thick – are the vertical load bearing elements placed every one metre distance max longitudinally and 1.5mtr distance transverse (There may be some changes according to the top loading and achieving the proper size of the platform). Hollow bulkheads allow travelling inside the hull for further work and inspection purpose. The thickness of bulk heads will be 25mm and consist of 2 layer of welded mesh.
- Method of construction of side panels and bulkheads by placing of reinforcement in above-described manner. Extra reinforcement will be provided for the continuation of the top panels. While constructing on ground special moulds will be used to cast the side wall and bulk heads. Mortar will be pumped to the inner cavity and vibrator will be used to compact the mortar. For Additional/Extra bulk heads can be added with prefabricated bulkheads by providing extra welded mesh on the joints and applying cement sand mortar.
- Applying mortar through pump and spray gun. Proper bonding agent will be applied all the joints before applying the mortar. (In certain cases, the spraying could be done the side panel along with the bottom slab only with well trained and experienced labour which will avoid the construction joints).
- De-shuttering will be carried out after 1 to 2 days

period check for the blow holes if any and repair the same (see repairing procedure).

- Internal Bulkheads could be fabricated externally and in sizes, and place it in location. The bulkheads are fix it by tying with additional welded mesh. Mortar will be pumped with spray gun to ensure complete penetration.



Fig. 1. Construction of bottom model

3) Top panel

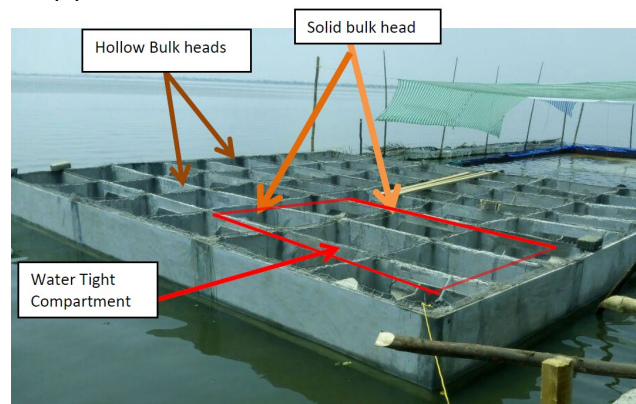


Fig. 2. Top panel

Top panel 35 – 40 mm thickness consists of 2layer of welded mesh One layer of 8mm tore and one layer of expanded metal.

- Pre-fabricated Top panels of 15 -20mm thick (with one layer of Welded mesh) will be place over the vertical bulkheads. The Top panel and verticals will be connected with additional welded mesh and expanded metal. Mortar will be sprayed with spray gun.
- Placing of 1-layer 8mm tore steel at 1-meter distances both direction and place one-layer welded mesh and expanded metal.
- Applying mortar by sprayer pump. Proper bonding agent will be applied on top panel before applying the mortar.
- Finishing and levelling the top surface with trowel.
- 350mm x 500mm man hole with cover made of ferrocement will be provided in appropriate positions for each water tight compartment.
- Ferro cement mortar mixed with chips size less than

20mm can be used for the pedestrians, foundations and dead weights, corrosion resistance capacity will be more that of the normal concrete mix.

4) *Floating platform detail*

Name: Floating Plat for, (IFP) Type 1

Length OA: 19.00 m

Breadth: 14.20 m

Depth: 1.20 m

Lightship Weight: 110.0 MT

4. Conclusion

This paper reviewed the detailed study of ferrocement technology, their composition, material and method for fabrication of ferrocement structure.

References

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