Experimental Investigation On Flexural Behavior Of Folded Ferro Cement Panels

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ABSTRACT

Ferrocement is a thin composite made with a bond based mortar framework strengthened with nearly spaced layers of moderately little breadth wire work. Throughout the years, applications including ferrocement have expanded because of its properties, for example, quality, strength, water snugness, softness, pliability and ecological security. Ferrocement may be thrown in different shapes and structures even without the utilization of frame work and are stylishly extremely engaging. Because of their slimness, ferrocement components can be utilized as material, deck components to cover extensive ranges. The thinness of these components may antagonistically influence their execution under working burdens. Henceforth, there is a need to concentrate their flexural conduct, for example, first break quality, stack redirection conduct. The present review depicts the consequence of testing collapsed ferrocement board strengthened with number of wire mesh layer. The principle point of these trial tests is to concentrate the impact of collapsed ferrocement board utilizing distinctive number of wire mesh layers on the flexural quality by differing the quantities of wire mesh layers on splitting, stack avoidance conduct, flexibility and extreme flexural quality. This is useful to find solutions by searching new design techniques and method of constructions.

Keywords: Experimental Investigation, Flexural Behavior, Folded, Ferro Cement Panels

1. INTRODUCTION

Ferrocement is a thin composite made with a bond based mortar lattice strengthened with firmly separated layers of relatively little distance across wire work. Throughout the years, applications including ferrocement have expanded because of its properties, for example, quality, sturdiness, water snugness, delicacy, pliability and natural soundness. Ferrocementmay be thrown in different shapes and structures even without the utilization of frame work and are tastefully exceptionally engaging. The achievement of ferrocement has been ascribed to the prepared accessibility of its part materials, the low level innovation required for its development and generally ease of conclusive items Due to their slimness, ferrocement components can be utilized as material/flooring components to cover extensive ranges. The slimness of these components may antagonistically influence their execution under working burdens. Subsequently, there is a need to concentrate their (a) first break quality, Mcr and (b) load deflection(P-d) conduct. While (an) and (b) describe the serviceability conduct of ferrocement components, it is similarly imperative to anticipate their flexural quality Mu one of a definitive farthest point states. Various examinations are accessible for the flexural investigation and outline of ferrocement individuals. However ferrocement components do frame breaks under specific loads much littler than a definitive load and have a sturdiness issue when unmodified concrete mortar is utilized. Solidness of a structure is its imperviousness to weathering activity, scraped spot, synthetic assault, splitting or whatever other procedure of annihilation. Consumption of fortification is one of the real purposes behind disintegration of ferrocement.The corrosion of reinforcement mainly depends upon the permeability of the cement mortar. So by proper selection of chemical and mineral additives, water cement ratio of ferrocement mortar can be reduced. This in turn reduces the pore size, there by achieving very high strength levels and durability and the flexural moment capacity of ferrocement elements increases with the volume fraction of reinforcement. Therefore the authors have conducted this investigation to improve the flexural behaviour and durability of ferrocement using modified mortar matrices. The objective of this investigation is to determine experimentally the corrosion performance of reinforcement in ferrocement beams subjected to an impressed current and a high salinity solution. In our project is to investigation of a definitive quality of precast ferrocement material/flooring components. In the present review collapsed molded ferrocement elements and model material components were thrown and tried.

2. EXPERIMENTAL INVESTIGATION

2.1 Material Characterization

2.1.1 Cement

Ordinary Portland cement of grade 53 is used in the mortar matrix and to prepare control specimens. Some ofThe properties of the cement are:
Specific gravity = 3.15,
Standard consistency = 34%,
Initial setting time = 40 mins,
Compressive strength = 52.16 N/mm^2.

2.1.2 Sand

Fine aggregate used is Trichy River Sand passing through sieve in 4.75mm with specific gravity of 2.62 and having a fineness modulus of 2.80 (IS 383-1971 Zone II)

2.1.3 Super Plasticizer

Super plasticizer-Conplast SP430 from Fosroc was added to improve the workability of fresh mortar.

2.1.4 Water

Potable Water was used for mixing and as well as for curing.

2.1.5 Skeletal Steel

Skeletal rod used in the present work is mild steel having 6mm diameter @ 100mm c/c both in transverse and longitudinal directions. The ultimate tensile strength of mild steel is 472 N/mm2

2.1.6 Wire mesh

Steel wire cross sections are considered as essential support. This incorporate square woven or welded networks, chicken (hexagonal/aviary) wire work, extended metal work and so on. Aside from extended metal work, for the most part every one of the cross sections are utilized aroused. Aroused Chicken wire mesh with a hexagonal opening of size 12mm and wire thickness of 1.29 mm was utilized as a part of this review.

2.2 Geometry of the Specimens

The geometry of the board is collapsed shape as appeared with measurements 1000 mm x 400 mm x 30 mm.The boards are developed utilizing the customary ferrocement materials, which is made out of concrete mortar and hexagonal wire work.

2.2.1 Casting of control specimens

Cement mortar cubes of size 70.7 mm × 70.7 mm × 70.7 mm are cast to test characterize the strength of the mortar mix.

2.2.2 Casting and curing of folded panels

Special mould was fabricated in metal sheet to match the required geometry of the folded panel. Each sample is molded after fixing the required wire mesh and skeletal steel in its proper position and shown in Figure.1

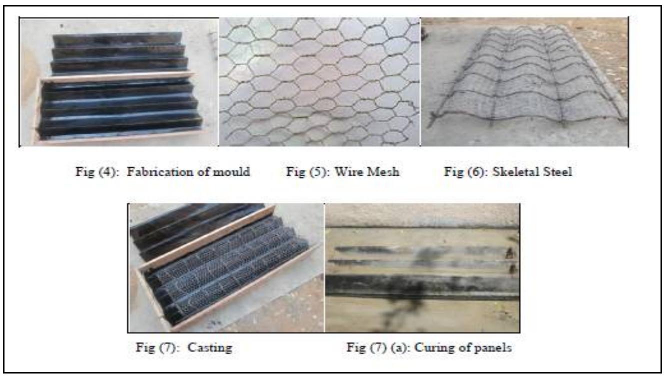

Figure.1 Casting and curing of folded panels

For the panels with single wire mesh, the wire mesh was placed at mid depth of the panel and the panels with double wire mesh, the wire meshes are placed on two sides of the skeletal steel. Then the panels were cast in mortar mix of 1:1 and water-cement ratio of 0.3 with proper compaction. After 24 hours of casting, the samples are removed from the mould and cured in water for 28 days

2.2.3. Testing of Specimens

All the panels were tested under loading frame. The load was applied by means of a load cell of 50 ton capacity. All the specimens were tested by simulating simply supported conditions. The load was applied as two symmetrically arranged concentrated line loads. Loading was applied using a Hydraulic Jack of 50 ton capacity. The Dial Gauge of 0.01 mm least count and 50 mm range was fixed at central bottom to measure the deflection. The panels were painted using white cement to help in tracing the cracks. The load was applied in small increments and simultaneously the deflection at the centre of the panel was recorded during the loading process up to failure. The deflection at the mid span is measured by Dial Gauge having accuracy to 0.01mm.Cracking was carefully checked throughout the loading process and the corresponding cracking load was also noted.

3. RESULTS AND DISCUSSION

The parameters that have been examined in this study are the impact of the geometry of the boards and number of wire mesh layers on breaking burden and extreme flexural quality and plot of load redirection bend for every board. The test outcomes are introduced in the underneath table, in which splitting and extreme load for the tried ferrocement boards are outlined. The splitting burden is practically consistent for the collapsed boards and it was not influenced by the quantity of wire mesh layers.The test results are given in Table1. and Figure.2

Table.1: Test results

Specimen Id	Cracking		Ultimate		Failure	
	Load (kN)	Deflection (mm)	Load (kN)	Deflection (mm)	Load (kN)	Deflection (mm)
FP-FD 01	10	2.9	20	6.14	16.7	17.49
FP-FD 02	10.5	2.8	27.5	12.79	17	7.62

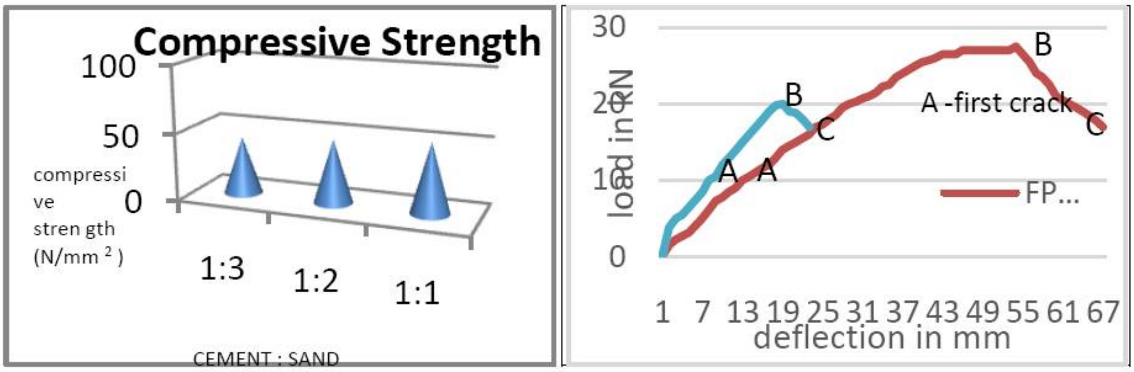

Figure.2 Test results

4.CONCLUSIONS

The following conclusions were drawn from the experimental study carried out on folded shaped ferrocement panels.

- The breaking burden was not essentially influenced by the quantity of the wire work layer especially for the collapsed boards.
- From the result, the flexural quality of the collapsed formed board with single layer wire mesh is higher than 91% and half separately when contrasted and level and trough board. The diversion at extreme load is lessened by 79% and 44% separately when looked at of level board and trough board. Folded panel with double layer wire mesh is higher than 89% and 54% respectively when compared with flat and trough panel. The deflection is reduced by 54% and increased by 6% respectively when compared of flat panel and trough panel.

- The experimental results show the superiority of the folded panels to the flat panel and trough panels in terms of ultimate strength and initiation of cracking. of layers of wire mesh from 1 to 2
- Finally increasing the number layers significantly increases the ductility and capability to absorb energy of both types of the panel.

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