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Flexural Performance of Lightweight Ferro Cement Panels by Using Expanded Metal Mesh with and without Glass Fiber: An Experimental Study

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Abstract –The present study describes the result of testing flat ferrocement with different number of wire mesh layer and variation in panel thickness. The number of wire mesh layer on the quctility flexural load- deflection curre, first crack load & ultimate load & ultimate strength of this type of ferrocement structure. The number of wire mesh layer is single, two & three layer also thickness of panel 20mm,30mm &40mm.Panels were casted with mortar of mix proportion (1:3) & water cement ratio (0.45). panels were tested under two-point loading system in utm machine after curring period 28 day. Tested result shows that panels with glass fibre exhibits greater flexural strength and less deflection.

Key Words – **Ferrocement, Expanded mesh, Flexural strength, Panel thickness, Glass fibre.**

1.INTRODUCTION

Concrete is building material that is currently is great demand which use ordinary Portland cement (OPC) as the main ingredient. Ferrocement sand mortar and single or multi-layer of steel wire mesh to produce element of small thickness having high durability high strength and rigidity.
Ferrocement is one of the construction materials which can be used to fulfill the need for building light structure. These characteristics have led to the successful use of ferrocement production in various industrial application such as hull construction new building structure repair and rehabitation structure.

2. Methodology

In order to study the strength and structural behavior and ultimate strength of ferrocement slab panel series of experiment have been carried out the chapter include the properties of material used casting of ferrocement slab panel and preparation of sample testing produce description of the testing instrument and the geometric the specimen. The experimental program includes preparing and testing of 54 ferrocement slab panel under two-point loading. The primary variable where the thickness of panel and no of layer of mesh and another variable is use of glass fiber

TEST RESULTS

The Parameters that had been investigated in this study are effect of the thickness of the panels on the cracking load and ultimate flexural strength and to plot the load deflection curve for each panel.

Table I Test Result for E_{20} Samples

Load (KN)	E_{20}11	E_{20}12	E_{20}13
0	0	0	0
0.5	0.51	0.4	0.46
1			0.9
1st Cracking Load	0.5	0.52	0.68
Max. Breaking Load	0.62	0.6	1.2
Deflection	0.91	0.87	1.16

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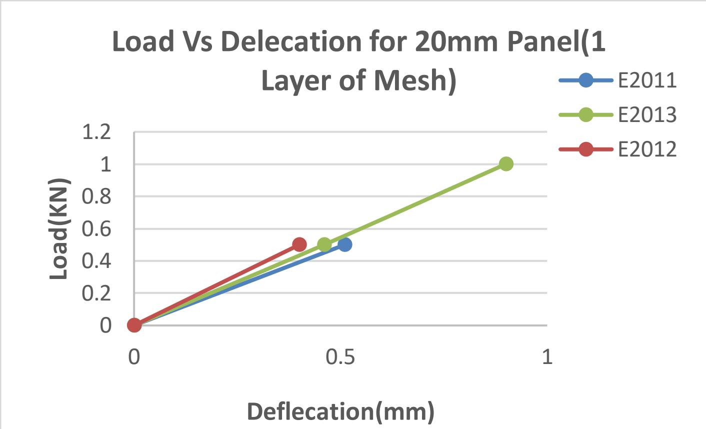
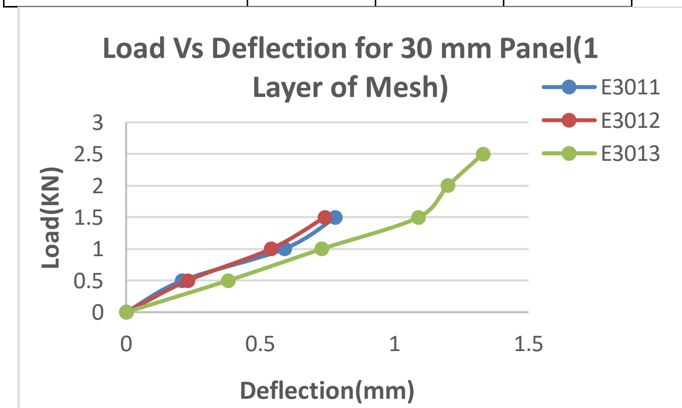


Graph I Load-Deflection curves for $E_{20}11$, $E_{20}12$ and $E_{20}13$ panels

Table II Test Result for E_{30} Samples

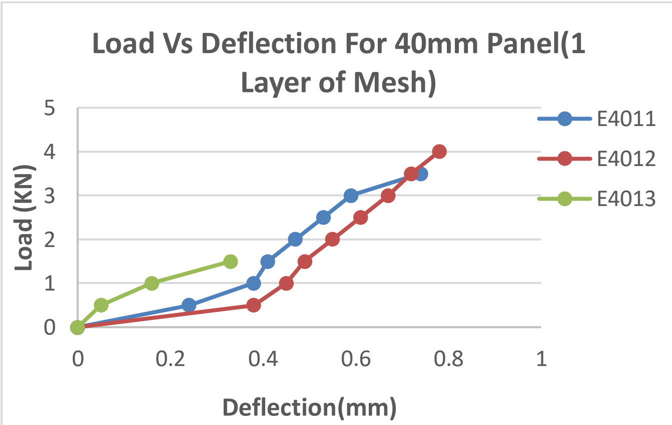
Load (KN)	$E_{30}11$	$E_{30}12$	$E_{30}13$
0	0	0	0
0.5	0.21	0.23	0.38
1	0.59	0.54	0.73
1.5	0.78	0.74	1.09
2			1.2
2.5			1.33
1st Cracking Load	0.88	1.78	2.4
Max. Breaking Load	1.64	1.9	2.8
Deflection	1.12	1.18	1.49



Graph II Load-Deflection curves for $E_{30}11$, $E_{30}12$ and $E_{30}13$ panels

Table III Test Result for E_{40} Samples

Load (KN)	$E_{40}11$	$E_{40}12$	$E_{40}13$
0	0	0	0
0.5	0.24	0.38	0.05
1	0.38	0.45	0.16
1.5	0.41	0.49	0.33
2	0.47	0.55	
2.5	0.53	0.61	
3	0.59	0.67	
3.5	0.74	0.72	
4		0.78	
1st Cracking Load	3.5	3.5	1.36
Max. Breaking Load	3.58	4	1.74
Deflection	0.76	0.78	0.6



Graph III Load-Deflection curves for $E_{40}11$, $E_{40}12$ and $E_{40}13$ panels

Table IV Avg. Flexural strength of ferrocement panels

Specimen	Avg.flexural strength at cracking load(σcr) (N/mm²)	Avg.flexural strength at ultimate load(σult) (N/mm²)
$E_{20}1$	3.1875	4.5375
$E_{30}1$	4.216667	5.283333
$E_{40}1$	3.91875	4.36875

3. CONCLUSIONS

The flexural load at first crack and ultimate loads depend thickness of ferrocement panels. As a thickness increases flexural load at first crack increases. Increasing the thickness also affected the final breaking load for slab panels therefore increasing the thickness of ferrocement panels 20mm ton40mm significantly increases the ductility and capability absorb energy panels.

The flexural strength of ferrocement panels at first cracking goes on increasing for 30mm and 40mm ferrocement panel. The flexural strength of ferrocement panels at first cracking is increased by 32.28% and 22.88% for 30mm and 40mm panels respectively as compared with 20mm panels.

The flexural strength of ferrocement panels at breaking load is increased by 16% for 30mm panels and decreased by 4% for 40mm panel as compared with 20mm panels respectively.

Optimization based on the above conclusion obtained by varying thickness of panels. Increasing number of mesh and use of glass fibers. Flexural strength is maximum for panels EG20 3 also the flexural strength is increased by 29.31% for EG30 compared with E30

4. REFERENCES

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