PAPER TITLE : EFFECT OF CONFINEMENT OF CONCRETE WITH SPECIAL REFERENCE TO FERROCRETE.

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Abstract- **Ferrocrete is a versatile construction material & highly suitable for a variety of structures. Ferrocrete is a composite material made up of cement, sand, skeletal steel, wire mesh and water & has unique combination of high strength and stiffness. As per ACI committee 549 Ferrocrete is a type of thin reinforced concrete construction where usually hydraulic cement is reinforced with layers of continuous and relatively small dia. It is noticed that if in the circular column weak concrete or lean concrete of grade say M10 or M15 if placed and if the same is surrounded by mortar of higher strength the overall strength of concrete is far more than the lean concrete placed inside. The project undertaken consists of placing lean concrete of M10 strength in a cylindrical confinement of 8 cm Φ and the same will be surrounded by mortar with outside diameter of 15 cm with 30cm height. With providing 1 wire mesh with 1 chicken mesh or 2 wire mesh with 2 chicken mesh as confinement. On carrying out compressive strength and Splitting Tensile strength test of the mould on U. T. M. Increase in the strength of the concrete due to lateral confinement is determined.**

Index Terms- **Birla Super 53 G OPC, Chicken Mesh, Fine Aggregate , Sand, Wire Mesh.**

I. INTRODUCTION

Ferrocrete was invented by a Frenchman, Joseph Louis Lambot, in 1848. The rapid development of reinforced concrete stifled the development of Ferrocrete until the second half of the 20th century. However, today there is increased recognition of Ferrocrete in applications where its properties, ease of construction and cost effectiveness provide a convincing extension to reinforced concrete technology. By way of Ferrocrete 's attribute as a thin reinforced concrete product and a laminated cement based composite, it can be used in numerous applications where a strong and tough protective shell is needed including in new marine and terrestrial structures and in the repair and rehabilitation of existing structures. Marine applications include boats, fishing vessels, barges, docks, etc. Terrestrial applications include water tanks, silos, irrigation channels, shells, and most importantly monolithic, prefabricated and self-help housing. Dwellings made out of Ferrocrete are known to resist tornado and hurricane forces significantly better than conventional wooden houses. Ferrocrete is considered an environmentally sound technology.

Although it is more than 150 years old, and in spite of numerous applications worldwide, there is no book that provides comprehensive information on the fundamentals of Ferrocrete in terms of analysis, design, construction, testing, mechanical properties, applications and potentialities. Yet the advantageous properties of Ferrocrete, such as strength, toughness, water-tightness, lightness, durability, fire resistance and environmental stability, cannot be matched by any other thin construction material.

At the mechanics and analytical modeling level, Ferrocrete falls in the family of thin laminated cementitious composites. Because of the brittle nature of cementitious matrices and their very low tensile strain capacity compared to that of the reinforcement, the mechanics of Ferrocrete differs from that of common fiber reinforced polymeric composites in which the matrix is ductile or has an ultimate tensile strain larger than that of the fiber. While numerous texts cover in depth composites with polymeric matrices, very few address the mechanics of brittle matrix composites such as Ferrocrete. Conventional elastic analysis of laminated composites, in. which elastic moduli for different loading or strain directions are used, need Significant refinement to remain applicable in the cracked (often inelastic) state of behavior in Which Ferrocrete and laminated cementitious composites fall. Rational Simplifications are needed for most common situations.

II. HEADINGS

1.INTRODUCTION

The effect of confinement of concrete with special reference to ferrocrete is observed by comparing the compressive and split tensile strength of concrete as per IS 5816 : 1999.

1.1 SAMPLE DISCRIPTION

A 15 cm diameter cylinder having height of 30 cm is taken as to prepare the cylindrical concrete core mold to perform compressive strength on it. Core of 10cm diameter and 30 cm height is identically kept in all the specimen of same grade of concrete. The two type of variation is done named as follows:

- Variation in confinement provided at periphery of inner core so classification was
  NO Wire Mesh, ONE Wire Mesh and TWO Wire Mesh
- With 1:3 mortar mix (A TYPE) and 1:2 mortar mix (B TYPE) which is applied at 2.5 cm thick periphery of inner core.

NOTE: (15-10) =5 cm of diameter or available 2.5 cm thick hollow cylindrical space.

2. ACKNOWLEDGEMENTS

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III. FIGURES AND TABLES

MATERIAL USED IN FERROCRETE

Weld mesh and Chicken mesh

Skeleton for mould

Proper rounding of Skeleton

Chicken layer application

Ready for installation in mould

Birla Super 53 G OPC

Weight batching of water and Admixture

Proper mixing of cement and C. Sand

Placing of M10 concrete in core and Mortar at periphery

Application of Glass lambi to stop Bleeding and Segregation

Removal of inner Mould

Vibration by Rubber Hammer

Moulds after casting

Finishing of Surface


After removing from mould 28 days Curing Tank

Carrying out 36 moulds to Durocrete Lab Compressive and Split tensile strength testing

5.1 RESULTS OBTAINED FOR COMPRESSIVE STRENGTH TEST

Placing of Mould on U. T. M.

Loading of Mould

Graph of Loading

1. EXPERIMENTAL INVESTIGATION AND ANALYSIS (PART 1)

1.1 RESULTS OBTAINED FOR COMPRESSIVE STRENGTH TEST

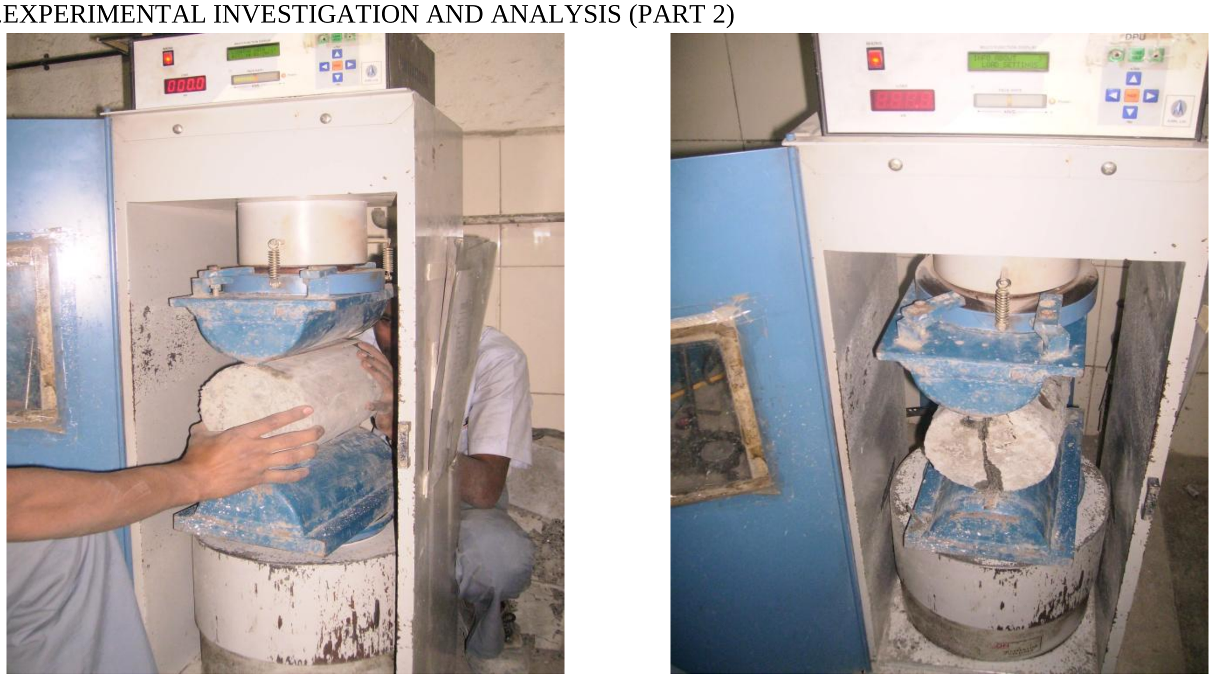
1.1.1 Summery of TYPE A (1:3 MORTAR MIX)

S/NO	SAMPLE ID	DISCRIPTION	MAX LOAD IN COMPRESSION (kN)	COMPRESSIVE STRENGTH (N/mm^2)	AVG OF SET $KN/N/mm^2$
1	A.1.1	NO WM	353.4	19.99	
2	A.1.2	NO WM	356.5	20.17	358.78/20.30
3	A.1.3	NO WM	366.44	20.73	
4	A.2.1	ONE WM	424.45	24.01	
5	A.2.2	ONE WM	435.75	24.65	432.38/24.46
6	A.2.3	ONE WM	436.95	24.72	
7	A.3.1	TWO WM	479.7	27.14	
8	A.3.2	TWO WM	493.5	27.92	484.8/27.43
9	A.3.3	TWO WM	481.2	27.23	

1.1.2 Summery of TYPE B (1:2 MORTAR MIX)

S/NO	SAMPLE ID	DISCRIPTION	MAX LOAD IN COMPRESSION (KN)	COMPRESSIVE STRENGTH (N/mm^2)	AVG OF SET
1	B.1.1	NO WM	371.05	20.99	
2	B.1.2	NO WM	395.3	22.36	388.23/21.96
3	B.1.3	NO WM	398.35	22.54	
4	B.2.1	ONE WM	458.45	25.94	
5	B.2.2	ONE WM	450.65	25.50	458.25/25.93
6	B.2.3	ONE WM	465.65	26.35	
7	B.3.1	TWO WM	568.95	32.19	
8	B.3.2	TWO WM	542.1	30.67	564.5/31.94
9	B.3.3	TWO WM	582.45	32.95	

2.EXPERIMENTAL INVESTIGATION AND ANALYSIS (PART 2)



EXPERIMENTAL SET UP FOR TESTING

2.1 RESULTS OBTAINED FOR SPLIT TENSILE STRENGTH TEST

2.1.1 TYPE A (1:3 MORTAR MIX)

S/NO	SAMPLE ID	DISCRIPTION	MAX LOAD IN COMPRESSION (kN)	AVG OF SET
1	A.1.4	NO WM	136.5	
2	A.1.5	NO WM	139	141.5

3	A.1.6	NO WM	149	
4	A.2.4	ONE WM	170	
5	A.2.5	ONE WM	175.9	173.63
6	A.2.6	ONE WM	175	
7	A.3.4	TWO WM	206	
8	A.3.5	TWO WM	211	213
9	A.3.6	TWO WM	222	

2.1.2 TYPE B (1:2 MORTAR MIX)

S/NO	SAMPLE ID	DISCRIPTION	MAX LOAD IN COMPRESSION (kN)	AVG OF SET
1	B.1.1	NO WM	154	
2	B.1.2	NO WM	165	159.66
3	B.1.3	NO WM	160	
4	B.2.1	ONE WM	190	
5	B.2.2	ONE WM	192.9	194.7
6	B.2.3	ONE WM	201.2	
7	B.3.1	TWO WM	236.2	
8	B.3.2	TWO WM	268.7	253.06
9	B.3.3	TWO WM	254.3	

IV. CONCLUSION

The percentage increase in strength due to confinement as well as due to change in mortar strength is observed.
The practical application in column can be decided on the basis of increase in strength.

REFERENCES

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