Experimental Study On Flexural And Impact Behavior Of Ferrocement Slabs

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ABSTRACT

Ferrocement is one of the structural materials, widely used due to its advantage from its particular behavior such as mechanical properties, and impact strength. The main aim of this work was to investigate the behavior of fibrocement reinforced with waste plastic fibers addition of 5% and 15% usage in ferrocement panels under impact loading. A total of 8 ferrocement panels with dimensions of 600mm x 600mm x 25mm (thickness) and 600mm x 400mm x15mm (thickness) were constructed and tested, 8 panels tested under low velocity impact. For impact test, the results showed that the addition of waste plastic fibers increased the number of blows which were required to make the first crack and ultimate failure, with the increase of number of pvc coated wire mesh layers.

Keywords: Experimental, Study, Flexural, Impact, Behaviour, Ferrocement Slabs

1. INTRODUCTION

Ferrocement is an innovative construction technology which is widely adopted throughout the world. It is a type of thinly reinforced and light-weight cementious composite constructed of hydraulic cement mortar with closely spaced layers of continuous and relatively small size wire/weld mesh, and cast to any shape due to its easy mouldability characteristics. Since the specific surface of reinforcement in ferrocement is one to two orders of magnitude higher than that of reinforced concrete, the larger bond forces are developed between the reinforcing mesh and cement matrices .The close spacing of the weld meshes in rich cement sand mortar and the smaller spacing of weld mesh layers imparts ductility, and leads to a better crack arresting mechanism in ferrocement. The applications of ferrocement are numerous including low-cost roofing/flooring on short spans and repair and rehabilitation of old/deteriorated structures. The success of ferrocement largely depends upon its durability aspects and corrosion problems of thin reinforcing wire/weld mesh.

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1.1. FIBER REINFORCED CONCRETE

Normal unreinforced concrete is brittle with a low tensile strength and strain capacity. Ordinary concrete includes numerous micro cracks which are rapidly increased under the applied stresses. These cracks are responsible of the low tensile, flexural strength, and impact resistance of concrete. The fibrous reinforced concrete is a composite materials essentially consisting of concrete reinforced by random placement of short discontinuous, and discrete fine fibers of specific geometry. It is now well established that the addition of short, discontinuous fibers plays an important role in the improvement of the mechanical properties of concrete. It increases elastic modulus, decreases brittleness; controls crack initiation, and its subsequent growth and propagation. De-bonding and pull out of the fibers require more energy absorption, resulting in a substantial increase in the toughness and fracture resistance of the material to cyclic and dynamic loads Concrete, the dominant construction material in our time, suffers from a major shortcoming; it cracks and fails in a brittle manner under tensile stresses caused by external loading or restrained shrinkage movements. Concrete failure initiates with the formation of micro cracks which eventually grow and coalesce together to form macro cracks. The macro cracks propagate till they reach an unstable condition and finally result in fracture. Thus, it is clear that cracks initiate at a micro level and lead to fracture through macro cracking. Fibres, used as reinforcement, can be effective in arresting cracks at both micro cracks and macro cracks from forming and propagating.

1.2. WASTE

Waste is defined as unused discharge products generated from human life, social and industrial activity. The industrial wastes are roughly classified into residential wastes and business wastes. Residential wastes are wastes discharged from human activities and consist of refuse and human waste, and are referred to as general waste. It also includes refuse and human waste generated from institutional facilities In developing countries, Increasing population levels, booming economy, rapid urbanization and the rise in community living standards have greatly accelerated the municipal solid waste generation rate. There was an incredible growth in the consumption of plastics due to their good safety, low cost, durability, lighter weight than competing materials, and extreme versatility and ability to be tailored to meet specific technical needs

1.3. WASTE PLASTIC:
The potential of using recycled plastic waste as reinforcing fibers in concrete studied. Different volume fractions varied between 5% to 15% of recycled plastic, low density polyethylene fibers (RP fibers) and control with no RP fibers were considered. The results showed that at volume fraction of 5to 15% of RP fibers, plastic shrinkage cracking was almost similar to plain concrete without RP fibers (i.e., 0%) while at a volume fraction of 3 to 4 %, no plastic shrinkage cracks were observed. Also, it was found that RP fibers have no significant effect on the compressive and flexural strengths of plain concrete at volume fractions used in this study. However, the RP fibers increased flexural toughness up to 270%.Al-hadithi, studied the effect of adding plastic chips resulting from cutting the plastic beverage bottles (which is used in Iraqi markets now) as fiber added to the polymer concrete and study there effects on some properties of polymer modified concrete like compressive strength and flexural strength. Results proved that, an improvement in mechanical properties with an increasing of waste plastic fibers percentage by volume. The increasing in flexural strength (modulus of rupture) appeared more clearly than that of compressive strength. The maximum increasing in the value of 28 day modulus of rupture equal to 24.4% for PMC mix with fiber percentage by volume equal to 0.1%, whereas the maximum increasing in compressive strength was equal to 4.1% for the same mix. Thirty kilograms of waste plastic of fabriform shapes was used by 5%, 15%, with 800 kg of concrete mixtures by Ismail. Many tests were done include performing slump, fresh density, dry density, compressive strength, flexural strength, and toughness indices. Curing ages of 3, 7, 14, and 28 days for the concrete mixtures were applied in this work. The results proved the arrest of the propagation of micro cracks by introducing waste plastic of fabriform shapes to concrete mixtures and also proved that reusing of waste plastic as a sand-substitution aggregate in concrete gives a good approach to reduce the cost of materials and solve some of the solid waste problems posed by plastics. There were some researches deals with investigating the effects of adding waste plastic fibers WPF resulting from cutting PET bottles on the concrete properties.

2. METHODOLOGY
Figure.1. shows the methodology adopted in this study

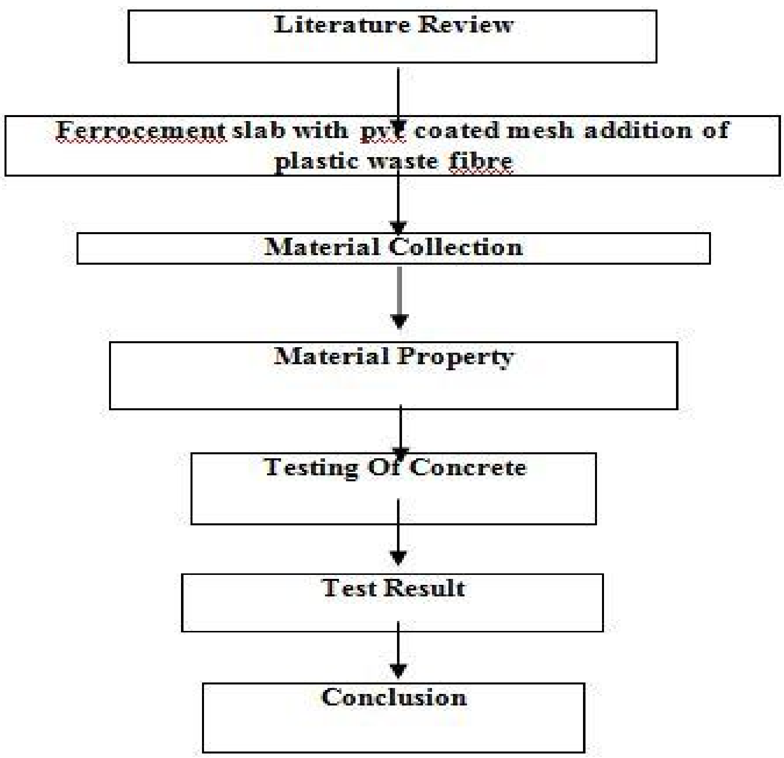

Figure.1 Methodology

3. MATERIAL COLLECTION

3.1. Cement (OPC)

The Ordinary Portland Cement of 53 grades conforming to IS: 8112 is used. The cement used is fresh and without any lumps. Physical property of cement is as per Table 1.

3.2. Aggregate

Aggregate give body to the concrete, reduce shrinkage and effect economy. One of the most important factors for producing workable concrete is a good gradation of aggregates. Minimum paste means less quantity of cement and less water, which are further mean increased economy, higher strength, lower shrinkage and greater durability.

3.3.Fine Aggregate

Those fractions from 4.75 mm to 150 microns are termed as fine aggregate. The river sand is used in combination as fine aggregate conforming to the requirements of IS: 383.(Table.2)

Table 1. Physical Properties Of (Opc) Cement Characteristic Value

Specific Gravity	3.12
Consistency	33%
Initial setting time	30 minimum
Final setting time	600 maximum

Table 2. Physical Properties of Fine Aggregate Characteristic Value

Type	Medium
Specific Gravity	2.38
Bulk Density	1613 kg/m3
Fineness Modulus	2.7

3.4 Water

Water is an important ingredient of concrete as it actually participates in the chemical reaction with cement. Since it helps to from the strength giving cement gel, the quantity and quality of water are required to be looked into very carefully. Water drawn from underground source of Padur premises is tested. A popular yard-stick to the suitability of water for mixing concrete is that, if water is fit for drinking it is fit for making concrete. This does not appear to be a true statement for all conditions. Some waters containing a small amount of sugar would be suitable for drinking but not for mixing concrete and conversely water suitable for making concrete may not necessarily be fit for drinking. Some specification also accept water for making concrete if the pH value of water lies between 6 and 8 and the water is free from organic matter. the source of water may be accepted. These criteria may be safely adopted in places like coastal area of marshy area or in other places where the available water is brackish in nature and of doubtful quality. However, it is logical to know what harm the impurities in water do to the concrete.

3.5. Ferrocement Construction Process

Construction sequencing/ process is important for ferrocement construction. Since the ferrocement elements are very thin in the order of 10-25 mm (0.39-1 in.), considerable care is to be taken to maintain minimum cover of 3 mm (1/8 in.).

3.5.1. Easy Storage

Not much storage space is required in ferrocement work for storing building materials as compared to traditional construction sites (using RCC) in which large number of cement bags, huge number of bricks, heaps of sand and coarse aggregates, heavy steel reinforcing bars, many steel sheets/plates, timber runners and planks for formwork works and large number of wood/ bamboo or steel pipes for scaffolding purposes are involved (Divekar, 2011b). Since the material such as weld/ wire mesh is available in rolled packs in the market, it can be easily purchased and stored, utilising less space. cement slabs when the percentage of SS fibers is increased from 0.5% to 2.5%. Further,

3.6. Waste Plastic Fibres

The waste plastic fibres were obtained by cutting waste plastic pots, buckets, cans, drums and utensils. The waste plastic fibres obtained were all recycled plastics. The fibres were cut from steel wire cutter and it is labour oriented. The thickness of waste plastic fibres was 1mm and its breadth was kept 5mm and these fibres were straight. The different percentage of fibres and suitable aspect ratio were selected and used in this investigation. he potential of using recycled plastic waste as reinforcing fibers in concrete studied by Alhozaimy. Different volume fractions varied between 1% to 4% of recycled plastic, low density polyethylene fibers (RP fibers) and control with no RP fibers were considered. The results showed that at volume fraction of 1 to 2% of RP fibers, plastic shrinkage cracking was almost similar to plain concrete without RP fibers (i.e., 0%) while at a volume fraction of 3 to 4 %, no plastic shrinkage cracks were observed. Also, it was found that RP fibers have no significant effect on the compressive and flexural strengths of plain concrete at volume fractions used in this study. However, the RP fibers increased flexural toughness up to 270%.Al-hadithi, studied the effect of adding plastic chips resulting from cutting the plastic beverage bottles (which is used in Iraqi markets now) as fiber added to the polymer concrete and study there effects on some properties of polymer modified concrete like compressive strength and flexural strength

Figure.2. Waste Plastic Fibres

Figure.3 PVC Coated Wire Mesh

3.6. PVC Coated Wire Mesh

PVC coated welded mesh with plastic covering is constructed with galvanized iron wire of high quality. It has PVC powder covering that is processed by an automatic machine. The smooth plastic coating on this corrosion protective wire is attached with a strong adhesive which make increases durability of the wire. It is used in fencing residential and official properties like gardens, parks, building. The PVC coated welded mesh which is available as both rolls and panels, is also available in different colors like white, black, green.. The inner materials wire of PVC coated welded wire mesh has steel wire, hot dipped galvanized wire, electro galvanized wire and low carbon steel wire. with a breakthrough coating process. The finished PVC coated welded wire mesh can have high corrosion resistance. Galvanized welded mesh is coated with a thick layer of PVC which is tightly bonded to the wire by a heat process. They have double protection. Not only does the vinyl coating seal the wire from water and other corrosive elements, but the underlying mesh is also protected by a zinc coating.

PVC Coated Welded Wire Mesh is used as fences, decoration and machinery guard in various industries, agriculture, mine developing, sports field, breeding and transport. And vinyl-coated welded wire mesh is suitable to be used for tomato cages.

Colors: Green, black, yellow, blue, white or other colors at customers request.

Riverdale’s PVC Coated Wire Mesh is a welded and galvanized steel fabric coated with our proprietary marine grade polyvinyl chloride (PVC) that is fuse bonded to the wire for ultimate protection. Riverdale PVC Coated Wire Mesh is galvanized after welding and manufactured using our exclusive hot-dip galvanizing and PVC coating process. Our coating method maximizes corrosion resistance by bonding the zinc and PVC coating to the wire. This process extends its service life beyond any other in the industry. Our PVC Coated Wire Mesh has a smooth, thick uniform coating that does not peel or crack even when exposed to harsh marine environments. For over 35 years Riverdale Mills has been producing the highest quality, strongest and longest lasting PVC Coated Wire Mesh available on the market.

4. MATERIALS PROPERTIES

4.1 Introduction

Materials properties like Properties of cement, Setting time, Consistency, Soundness and properties of fine & recycled aggregate

4.2 Properties Of Cement

4.2.1 Physical Properties Of Cement

- Setting Time
- Soundness
- Fineness
- Strength

4.3 Properties Of Fine Aggregate

- Absorption, Porosity, And Permeability
- Surface Texture
- Strength And Elasticity
- Hardness

4.4 Properties Of Water

Water used for mixing and curing shall be clean and free from injurious amounts of Oils, Acids, Alkalis, Salts, Sugar, Organic materials Potable water is generally considered satisfactory for mixing concrete Mixing and curing with sea water shall not be permitted. The pH value shall not be less than 6

- Role of Water in Cement Concrete
- Requirements of water used in concrete
- The permissible limits for solids in water
- Solids Permissible Limits (Max)
- Organic 200 mg/lit
- Inorganic 3000 mg/lit
- Sulphates (SO4) 500 mg/lit
- Chlorides (Cl) 500 mg/lit
- Suspended matter 2000 mg/lit Water/Cement Ratio and Strength
- A minimum w/c ratio of about 0.25 by weight is necessary to ensure that the water comes into contact with all cement particles (for complete hydration)
- Typical values are 0.25 to 0.6Increased strength.
- Lower permeability.
- Increased resistance to weathering.
- Better bond between concrete and reinforcement.
- Reduced drying shrinkage and cracking.

4.5 Properties Of PVC Coated Mesh

This study has used PVC-coated weld mesh 'P' mesh, as shown in Fig, and its properties as in Table.3, manufactured by Della; and synthetic non-corrosive type of fibers, namely the Bar-chip Polyolefin (PL) fibers are manufactured by Elasto Plastic Concrete (EPC, Australia), and the properties of PL fibers are given in Table.3

Table No.3: Properties Of Pvc Coated Mesh

Tensile Strength (N/mm^2)	512.36
Yield Stress (N/mm^2)	406.51
Elongation (%)	7.12
Weld Shear (N/mm^2)	250
Outer Coating Material	PVC
Density (g/cm^3)	7.82
Outer thickness (mm)	0.83 mm (22 gauge)
Inner Material thickness (mm)	0.70 mm (24 gauge)
Outer Coating thickness (PVC-coating) in microns	7 to 9
Inner Coating thickness (Zinc-coating) in microns	4 to 6

4.6 Properties Of Ferrocement
The unique properties of ferrocement are described in detail in this section. Also, the research scope on ferrocement is identified and given in this section by the present authors. Unique Properties & Research Scope Ferrocement has a high tensile strength and stiffness and a better impact and punching shear resistance than reinforced concrete, because of two-dimensional reinforcement of the mesh system on a per volume basis and undergo large deformations before cracking or high deflections before collapse High surface area imparts ductile characteristics to ferrocement even though mortar is weak in ductility; hence meshes of both square and hexagonal apertures are adopted Specific surface (which is the contact area of reinforcement per unit volume (sq.in./sq.ft) as compared to RCC slab of 100 mm (4 in.) thick whose specific surface is 3,375mm2/sq.m (0.5 sq.in./sq.ft) The modulus of elasticity of ferrocement with CM 1:2 is comparable with M40 grade concrete and CM 1:3 is of M35 grade concrete, and the compressive strength of cement mortar 1:3 (cement: sand) is about 20 MPa (2900 psi).

4.6.1 Properties Of Waste Plastic Fibre
The experimental program was planned to investigate the effect of using waste plastic on the mechanical properties and impact resistance of Ferrocement. The test variables include compressive strength, flexural strength. Number of wire mesh Ferro-cement slabs for low and high impact tests.

4.6.2 Moulds Of Ferrocement Slabs
For low velocity impact strength, square slabs of 600 × 600 × 150 mm were used respectively. Experimental program was planned to investigate the effect of using waste plastic fibers on the impact resistance of Ferrocement. The test variables include Ferrocement slabs for low and high impact tests. shows the details of reference concrete mix and concrete with fibers mixes.

4.6.3 Mixes
The proportion of the constituents for the prepared concrete mix is 1 : 2 (by weight) of ordinary Portland cement: fine aggregate of maximum size 4.75 mm with a water/ cement ratio of 0.45 and waste plastic fiber is used as a ratio by volume of mixture of 0.5%, 1.0%, and 1.5% as percentage . The water/cement ratio used is 0.45 for all mixes.

5. CASTING OF TEST SPECIMENS
The specimens of size 600mm x 600mm x 25mm (thickness) and 600mm x 400mm x 15mm (thickness) were cast for conducting the flexure tests. Aluminium moulds with open top and bottom was fabricated for casting the above specimens, and placed on thick plywood plank (free from undulations to get a good slab finish), after demoulding. The contact surfaces of the mould to the plywood bottom and sides were greased (oiled) before casting for easy demoulding of specimens. The cement mortar was properly mixed in a dry pan by adding required amount of water. For 15mm thick cementious slabs with 1 layer mesh, the cement mortar is laid for 7 mm on the bottom of mould and well-compacted, and then single layer mesh is placed (at centre of slab) over the finished mortar, and the balance 7 mm mortar is laid with good compaction, and top surface finished layer mesh, the cement mortar was laid for 3 mm cover area (using 3 mm glass spacer cover blocks), and the first layer of mesh was placed on the finished compacted cover mortar; and then, above the first mesh layer, 7 mm mortar was laid and properly finished; and next, second layer mesh has been placed, and finally the top cover area of 3 mm was spread above this second layer and top slab surface well-finished using straight edge. Similar process of laying for 3 layer mesh was done, except that the additional mesh layer has been placed in the centre of the slab. The specimens were demoulded after 24 hours and been transferred to the curing tank where they were allowed to cure for 28 days. After sufficient curing, ferrocement panels were removed from the water tank, surface dried and white washed at the top surface so as to have a clear picture of formation and propagation of cracks during flexure test.

5.1. Curing Of Slab
Curing is the maintenance of a satisfactory moisture content and temperature in panel slab for a period of time immediately following placing and finishing so that the desired properties may develop. The need for adequate curing of slab cannot be overemphasized. Curing has a strong influence on the properties of hardened slab; proper curing will increase durability, strength, water tightness, abrasion resistance, volume stability, and resistance to freezing and thawing and deicers. Exposed slab surfaces are especially sensitive to curing as strength development and freeze-thaw resistance of the top surface of a slab can be reduced significantly when curing is defective. When portland cement is mixed with water, a chemical reaction called hydration takes place. The extent to which this reaction is completed influences the strength and durability of the slab. Freshly mixed mortor normally contains more water than is required for hydration of the cement; however, excessive loss of water by evaporation can delay or prevent adequate hydration. The surface is particularly susceptible to insufficient hydration because it dries first. If temperatures are favorable, hydration is relatively rapid the first few days after mortor is placed; however, it is important for water to be retained

in the slab during this period, that is, for evaporation to be prevented or substantially reduced. With proper curing, slab becomes stronger, more impermeable, and more resistant to stress, abrasion, and freezing and thawing. The improvement is rapid at early ages but continues more slowly thereafter for an indefinite period. Figure.4 shows the strength gain of slab with age for different moist curing periods and shows the relative strength gain of slab cured at different temperatures.

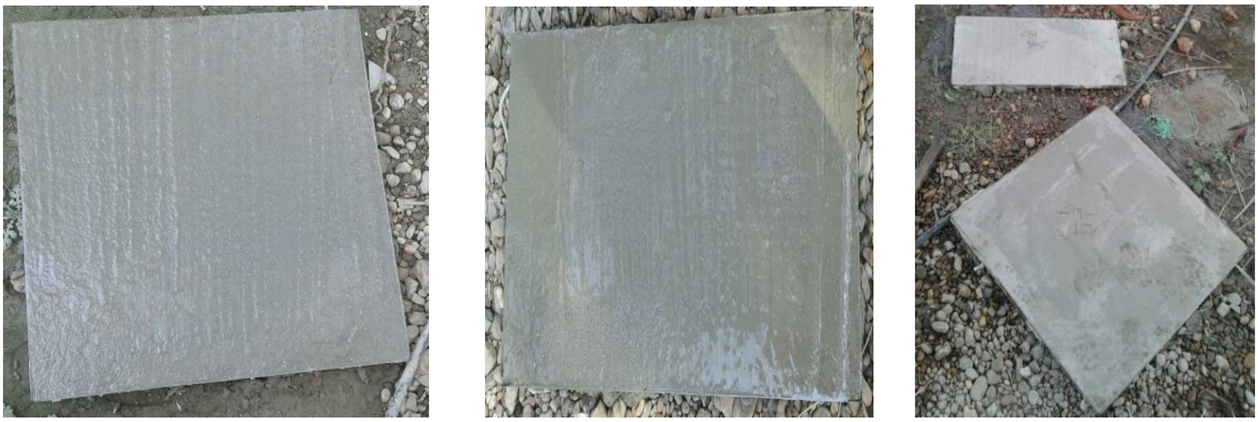

Figure.4 Finishing Of Ferrocement Slabs With PVC-Coated Mesh and Ferrocement Slab Specimens

6. TESTSING OF CONCRETE

6.1 Testing Of Hardened Concrete

For compressive strength test a 150 × 150 × 150 mm concrete cubes were used according a 2000 kN capacity ELE testing machine was used for the compressive test .The average compressive strength of three cubes was recorded for each testing age (14,28 and 56 days). A 100 × 100 × 500 mm (4 × 4 × 20) concrete prisms were prepared according to ASTM C192-88 [33]**.**The test was carried out using two points load according to ASTM C78-94 **[**35**]** using ELE 50 KN capacity machine. Average modulus of rupture of three prisms was obtained for each testing age (14, 28 and 56) days.

6.2 Impact Test

The resistance of concrete under dynamic loadings can be assess through different types of test procedures, such as the explosive test, drop-weight test, projectile impact test, and constant strain rate test the drop-weight test, as reported by the ACI Committee 544 is the rig which is used in this research. The low velocity impact test was conducted using 1400 gm steel ball dropping freely from heights 2.4 m and 1.2 m . Thirty two, 56-day age 600 × 600 ×25 mm slab and 600 × 400 ×15 mm slab specimens were tested under low velocity impact consists of three main components as shown in Figure. A steel frame ; strong and heavy enough to hold rigidly during impact loading. The dimensions of the testing frame were designed to allow observing the specimens (square slab) from the bottom surface to show developing failure, during testing. The specimen was placed accurately on mold which were welded to the support ensure the simply supported boundary condition. The vertical guide for the falling mass used to ensure mid-span impact. This was a tube of a round section. Steel ball with a mass of 1400 gm . Specimens were placed in their position in the testing frame with the finished face up. The falling mass was then dropped repeatedly and the number of blows required to cause first crack was recorded. The number of blows required for failure (no rebound) was also recorded. The number and details of specimens which were used in this test

6.3 Flexural Strength Test

1. Testing Of Flexure Panels

A special flexure loading frame was exclusively fabricated for testing the slab panels and the details of the test setup Is shown in. In order to test the slabs on a four point loading (at $1/3^{rd}$ span), over an effective span of 600 mm, the centre line of the panel, and the roller supports were marked and ferrocement panel was seated on the bottom rollers. Then these two roller supports were slowly raised by means of hydraulic jack till the panel touched the top roller support. Loading was applied manually through a hydraulic jacking arrangement to cause upward deflection (see in order to facilitate easy measurement of deflection and crack width and also to study the crack pattern.

Figure.4. Compressive strength test

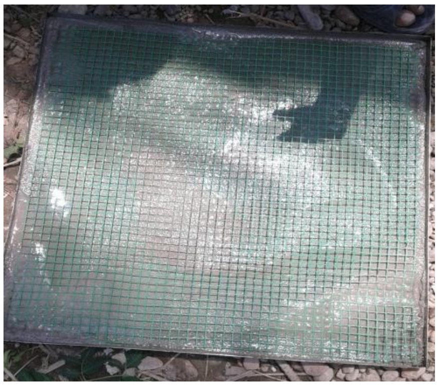

Figure.5 Slab with P.V.C coated mesh

Figure6. Finishing stage of P.V.C mesh with 5% industrial waste, Slab with steel mesh and Finishing stage of steel mesh with 5% industrial waste

Figure.7. Finishing stage of steel mesh with 15% industrial waste, P.V.C coated mesh with 600 x 300 mm slab size and Steel mesh with 600 x 300 mm slab size

The load was given through the jack in small increments and the mid-span deflection of the centre of the slab was recorded up to failure using an external LVDT. The proving ring readings and displacement values were observed simultaneously. The proving ring readings have been taken at every 5 division interval and the corresponding deformation values were observed in the displacement indicator. Figure.5 shows the slab with P.V.C coated mesh and Figure 6 and Figure.7 shows different prepared slabs. The loading was continued till the ultimate failure of the slab panels is reached, and the above measurements were taken at different load levels until final failure. The initial and final crack width was measured using a crack detection microscope. The ductility (deflection) of ferrocement composites using different reinforcing mesh types („P and „G) and varying mesh layers has been studied at first crack and ultimate failure loads, and reported

8. RESULTS AND DISCUSSION

8.1 Flexural Strength Test

A total of 8 specimens were tested in this investigation on four point loading tests (averaging three test specimens per category of 1, 2 and 3 layer and meshes) and the results of the experimental tests carried out are analysed including the flexural loads, deflection and crack width and given in Table.4 and Table.5. It has to be noted that the identification of the specimens tested in this study are done using a combination of two or three sets of characters. The letter in the fi rst set of characters refers to the type of matrix (PLAIN stands for Plain Cement Mortar, made of cement and sand, and no coarse aggregates), the letter in the second character refers to number of layers (SL stands for Single Layer, DL for Double Layer, and TL for Triple Layer), and P in brackets (P) indicates PVC-coated steel weld mesh.

Table.4 Flexural Test Results Of Ferrocement Slabs

S. NO	Slab Identification	First Crack Load (kN)	Ultimate Failure Load (kN)	Deflection (mm)	
				At First Crack	At Ultimate Failure
1	Steel mesh with 5% plastic waste (A)	0.428	0.478	1.46	5.62
2	Pvc coated mesh with 5% plastic waste(B)	0.380	0.582	1.04	7.32
3	Steel mesh with 15% plastic waste (C)	0.456	0.508	0.96	7.12
4	Pvc coated mesh with 15% plastic waste (D)	0.420	0.598	1.42	7.48

Table.5 Flexural Strength Test

Slab Identification	Type / Layers of Meshes	First Crack Load (kN)	Ultimate Failure Load (kN)	Deflection (mm)		First Crack Width (mm)	Final Crack Width (mm)
				At First Crack	At Ultimate Failure		
PLAIN SL (P)	Single Layer PVC-coated („P") Weld Mesh	0.376	0.474	1.02	5.67	0.15	1.90

8.2. Mode Of Failure Under Low Velocity Impact

The failure of specimens, tested in this work. it can be seen that, for slabs used in low velocity impact tests, the waste plastic fiber reinforced ferrocement slabs failed with number of blows more when compared with reference mix and the crack started from center of top face and propagated on length and width of specimens, and specimens failed (ultimate failure) with number of blows more than that in first crack stage. It is obvious from these figures that, the failure of slabs reinforced with two or three layers of wire meshes happened without cracks, or in other words the ball penetrated the slabs without madding any cracks . For impact test in which the height of falling mass equals 2.4 m , the unreinforced slabs with wire mesh reach the ultimate failure with a number of blows near to the number of blows that caused a first crack. For low velocity impact tests with falling mass, failure of unreinforced concrete was more brittle than the waste plastic fiber reinforced ferrocement slabs. The slabs made of reference mixes reach the first crack and ultimate failure at a number of blows less than that of the slabs made of waste plastic fiber reinforced ferrocement slabs.

8.3 Impact Test Results

Impact Test Results shown in Table No:6.

Table No.6 Impact Test Results

S.NO	Slab Identification	N1	N2	IMPACT ENERGY AT FIRST CRACK (kg mm)	IMPACT ENERGY AT FAILURE (kg mm)
1	Steel mesh with 5% plastic waste (A)	19	35	7847	14455
2	Pvc coated mesh with 5% plastic waste(B)	15	28	6195	11564
3	Steel mesh with 15% plastic waste (C)	21	37	8673	15281
4	Pvc coated mesh with 15% plastic waste (D)	17	30	7021	12390

9. CONCLUSIONS

Based on the extensive research work, the following conclusions can be drawn:-

1. The flexural strength of waste plastic fibers reinforced ferrocement had shown an increase due to the inclusion of fiber for the reinforced and unreinforced specimens.
2. Low velocity impact resistance of waste plastic fiber reinforced ferrocement panels is greater than that of the reference ferrocement panels. The slabs of waste plastic fiber reinforced ferrocement need more blows to cause first crack and ultimate failure compares with references panels. Also the energy absorbed by waste plastic fiber reinforced ferrocement panels increased with increased the volume of fibers and number of pvc coated wire meshes.
3. In general, the ferrocement layers showed good stiffness, ductility and impact
4. resistance. The impact resistance of the ferrocement was improved with higher ratio of volume fraction. The drop load depth can be a reasonable indicator of cumulative damage in the case of drop impact test. The thickness of the slabs increases the absorbed energy. The impact resistance of ferrocement is improved with increase in number of meshes/layer
5. The flexural loads at first crack and ultimate loads depend on number of reinforcing mesh layers used in ferrocement. Increase in number of mesh layers also improves the ductile behaviour of ferrocement slabs.
6. The deflection of slabs at first crack using PVC-coated weld mesh is showing about 25% more ductile behaviour than slabs with steel coated weld mesh.
7. The progressive loading behavior from first crack to ultimate failure of ferrocement specimens reinforced with PVC-coated mesh is same as steel-coated mesh,

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