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STUDY ON THE STREBGTH CHARACTERISTICS OF FRC WRAPPED WITH G-900 GSM

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Abstract -*Now a days facing the waste plastics are major problem to environment, hence in our life style depends upon the plastics only so that indirectly we are the reasons for protects our surrounding environment by proper management techniques, we are using waste plasic buckets are disposed or recycled and properly maintain beauty of the nature. To finding this solutions plastics are using as a fibers, the percentage of 0.5% are using in this Grade of M-30 concrete 0.45 w/c ratio and 1.5% of super plasticizer for workability of concrete.*

In this work the performance waste plastic fibers and steel fibers are used in this concrete. The total 1% by volume of concrete are added, i e, 0.5% of waste plastic fiber and 0.5% of steel fibers are used. The various mechanical properties are Compressive, Tensile, Flexural and tensile strengths are find out. The new word G-900, means glass fiber re-inforced polymer are laminated to normal and hybrid concrete. And to knowing the comparison of various of them.by using the GFRP the strength properties are increased of M-30 grade of the concrete. The mechanical properties are prepared and tested for 28 days. The results are each properties of compared hybrid over controlled mix.

Key Words: *compressive tests, flexural tests, gloved end steel fiber, waste plastic fiber, , GFRP*

1.INTRODUCTION

General concrete is mixture of cement fine aggregate coarse aggregate water and admixture concrete is an important role of civil engineering to construct major buildings like multistoried buildings hospitals shopping malls apartments etc Concrete is a major role for all construction activities Hence to not achieve the strength so that adding fibrous materials into the concrete to gain excess strength of hardened concrete. The various materials are Steel fibres, polypropylene fibres, waste plastic fibres is etc. In the concrete mixer the ordinary Portland cement concrete mixer together water this forming hard stratum and molded into any shape and size. The cement reaction with chemically with the other particles like water and other ingredient particles to form hard Matrix or hard structure, which is binding all cementitious materials together into a durable like a stone, this is used for various construction works like they are foundations, beams, columns, etc.

Now a days, in our India recently the domestic waste plastics, jugs, etc which are some parts degradable to environment. This is cause to natural resources depletion and also country resources are occur. Hence the waste plastic buckets are using to achieving the greater strength to enhance the concrete strength. The performance of concrete depends upon the ingredients of cementatious materials.

Very different fibres are used in cement concrete hence they are natural fibres, Steel fibre, polypropylene fibre, glass fibre etc these are incorporate the concrete and also Mechanical properties the above fibre are researches are made done hence but continue procedure is going process improvisation there properties of concrete. In the present paper the effects of the adding of waste plastic fibre and their behaviour of concrete. The various effects on this fibre are compression split tensile flexure and shear test to knowing by adding different percentage of combined fibres.

2. OBJECTIVE

- The present work is to find out the strength of the steel fiber and waste plastic fiber on the different properties M-30 grade of concrete.
- 0.5% of steel fiber (wf) and 0.5% of waste plastic fibers (wpf) are added,(SF+WPF) and total 1% the volume of concrete are added.
- Comparing the conventional concrete with and without GFRP Wrappings and to knows the failure patern of the structure.
- To comparing between the hybrid concrete with wrapped and without wrapped.To knows various strength tests are compressive, flexural tests.

3. MATERIALS USED

3.1 CEMENT

Ordinary Portland cement(OPC) grade of 53 the product of cement is Birla A1,the properties are as per IS codes-12269-1987. The cement is an impotant role in the concrete to attains the strength.

3.2 Fine Aggregate

Shahpur sand which is local available in Zone II which is passing through Sieve size 4.75 mm. As per IS 383-1978. Its act as a filling voids to coarse aggregate.

3.3 Coarse Aggregate

Local produced materials which are passed 20mm and retained in 12.5mm sieve, as per IS383-1978. This materials act also binding property.

3.4 Super Plasticizer

The super plastisizer is a water reducer material property,hence workability of mixer quantity is very harsh, that can prevent, so improve workability and also the strength, in this plasticizer is used as a Sikament, the dosage are used 1.5% of concrete.

3.5 Gloved end - Steel Fiber

Above Steel fiber are brought from M&J International, Mumbai of Length 50mm and 1mm dia. As known concrete is weak in tension steel is added act as reinforcement to concrete.

3.6 Waste plastic fiber (WPF)

The above plastic fibres specially waste buckets are collected from scrap shops, homes, etc obtained then after it should properly washed and cleaned,after making properly cut by the proper dimensions are used in this study. The length of 50mm was used and thickness of 1mm making aspect ratio of 50mm.

3.7 Glass fiber reinforced polymer(GFRP)

GFRP is in a fabric type of sheet form available in **BASF company's from Bengaluru.** Fiber used which is G-900 gsm available over to incorporated in compression and flexural in concrete.

4. MIX DESIGN

The concrete design IS 10262:2009 they have conducts many research and laboratories for getting the strength of the concrete. In this project we have conducted for M-30 grade of concrete Hybrid Fiber Reinforced Concrete (HFRC). Fibers are used Gloved end Steel Fiber & WPF (Waste plastic fiber) and added total of 1% of volume of fiber to concrete i.e 0.5% of WPF + 0.5% SF using made to used as a Hybrid concrete.

The design mix for 1 m^3 of M30 mix proportion is 1:1.49:2.71

5. EXPERIMENTS AND RESULT

- **COMPRESSION TESTING FOR CUBE**

The concrete strength is an very important test, to knowing the how much concrete is hardened . it is very simple test of size is 150*150*150mm, the cubes are well compacted for 25 blows from IS code making of three layers to well compacted then day the specimans are cured for 7, 14, and 28 days, after from curing well, and it is dried in the air then after cube was tested then results are noted down as Load by Failure area.

The cube strength = load/ area

=……N/mm^2

- **COMPRESSIVE STRENGTH TESTS 28 DAYSRESULT**

Normal Concrete Without Wrap GFRP Results:

S.NO	Load KN	Strength in N/MM^2	Avg Strength N/MM^2
1	790	35.11	39.55
2	1020	45.33	
3	860	38.22	

Normal Concrete With Wrap GFRP Results:

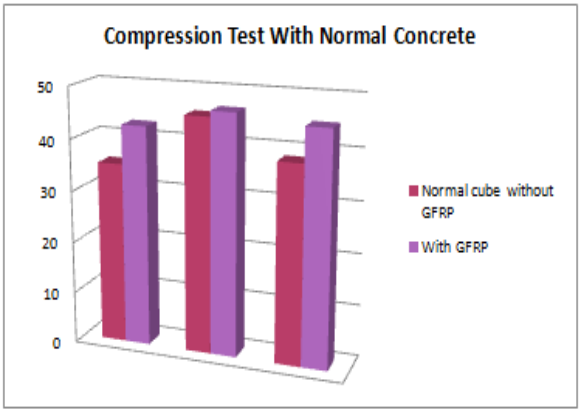
S.NO	Load KN	Strength in N/MM²	Avg Strength N/MM²
1	960	42.67	44.67
2	1045	46.44	
3	1010	44.89	

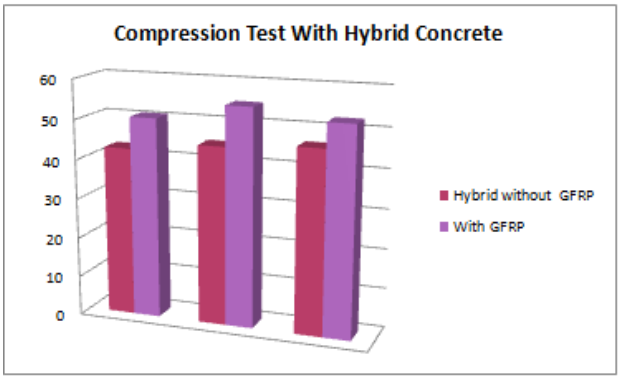
Hybrid Fiber Re-inforced Concrete Without Wrap GFRP Results:

S.NO	Load KN	Strength in N/MM²	Avg Strength N/MM²
1	960	42.67	44.59
2	1010	44.89	
3	1040	46.22	

Hybrid Fiber Re-inforced Concrete With Wrap GFRP Results:

S.NO	Load KN	Strength in N/MM²	Avg Strength N/MM²
1	1140	50.67	52.67
2	1235	54.89	
3	1180	52.44	





- The result above graph of normal with and without GFRP is increased of about 5N/mm²

  And also wrapped GFRP is increased comparing without GFRP. The average in 11.50% high.

- **FLEXURAL TESTING FOR PRISM FOR 28DAYS RESULTS**

This test generally used to finding out the flexural strength or modulus. Flexural test is to known by U.T machine, Two point contact loading of which the size is 100*100*500mm. the load is applied horizontally by the above load is applied until its break or crack.

Formula for finding the strength: $P*L/B*D^{2}$=_____mpa

Where,

P= load L= length

B=breadth=depth

Normal Concrete Without Wrap GFRP Results

S.NO	Load TN	Strength in N/MM²	Avg Strength N/MM²
1	1.450	7.11	7.411
2	1.510	7.40	
3	1.575	7.725	

Normal Concrete With Wrap GFRP Results

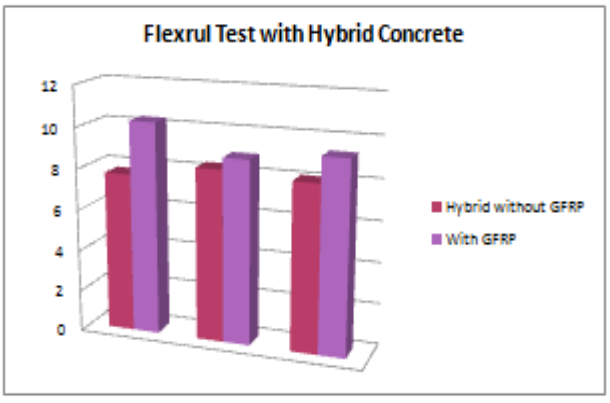
S.NO	Load TN	Strength in N/MM^2	Avg Strength N/MM^2
1	1.675	8.215	8.092
2	1.625	7.970	
3	1.650	8.093	

Hybrid Fiber Re-inforced Concrete Without Wrap GFRP Results

S.NO	Load TN	Strength in N/MM^2	Avg Strength N/MM^2
1	1.575	7.725	8.04
2	1.700	8.33	
3	1.650	8.09	

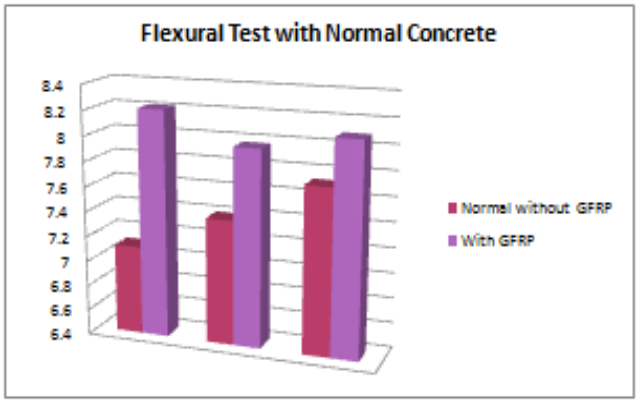
Hybrid Fiber Re-inforced Concrete With Wrap GFRP Results

S.NO	Load TN	Strength in N/MM^2	Avg Strength N/MM^2
1	2.1	10.3	9.51
2	1.815	8.90	
3	1.9	9.32	



In flexural strength the percentage is increased 0.68 N/mm^2 of normal concrete.

With and without of hybrid concrete is varied 1.18%.



6. CONCLUSION

Form study of project conducted based on results and observation conclusion are listed below

i. For hybrid M30 mix concrete workability is poor so use of super plasticizer is used for increase in workability of concrete.
ii. Adding of two fiber (SF+WPF) is increased in compressive strength, not much in Flexural test.
iii. The results of normal cubes with and without GFRP is increased of about 5N/mm^2 and wrapped GFRP of cube is increased comparing without GFRP. The average strength in 11.50% high.
iv. GFRP laminting done with and without fiber of concrete tremendous increased in strength characteristics comparing conventional concrete while done tests.

7. REFERENCE

- Reinforced concrete using domestic waste plastics as fibres" ARPNJ vol 6 no 3, (March Manaswini C, Vasudeva "Fibre re-inforced concrete from industrial waste- review" IJIRSET, vol 4, (Dec 2015).
- Khilesh sarvwe "Study of strength property of concrete using waste plastics and steel fiber IJES vol 3 (Nov 2014).
- RavikumarG, Manjunath M "Investigate on waste plastic fibre reinforced concrete using manufactured sand as fine aggregate" IRJET, vol 2 (July 2015).
- Dr PB Nagarnaik, Dr dk Parbat,RN Nibudy, Dr AM Pandey " Strength prediction of plastic fiber reinforced concrete(M30) IJERA vol 3,(Jan- Feb 2013).
- R Kandasamy, R Murugesan "Fibre 2011)
- Deepak kumar, Govind Ravish "USE of GFRP(glass fiber reinforced polymer) for strengthening of reinforced concrete beam" SSRG-IJCE (April 2015)
- M.S.Shetty, "Concrete Technology and Theory of Practice", S.Chand & Co.Ltd : 2004
- IS: 12269 – 1987. "Specifications for 53 grade ordinary Portland cement". BIS, New Delhi, India.

- IS 516:1959 " Methods of tests for strength of concrete" BIS New Delhi, India.
- IS 383:1970 (re affirm1997) Specification for Coarse and Fine aggregate from natural sources for concrete. BIS New Delhi
- IS 456:2000 Plain and Reinforced Concrete- Code of Practice(Fourth Revision)
- IS 10262-2009 Concrete Mix Proportioning – Guidelines (First revision).Bureau of Indian Standards, New Delhi.
- Wikipedia
- Internet Search engines

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