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Checking the various parameters of FRC (Fibre Reinforcement Concrete) using the Steel and Glass Fibres

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ABSTRACT

Concrete is eco-friendly in our modern world in all developing and developed country. It plays very vital role in construction world it is locally available material and adding steel fibre and glass fibre in concrete it increase the strength and durability of concrete. Glass fibre increase the smoothness and provide crack free of concrete. As we know that concrete is brittle material when load is applied on it get cracked so to protect from it random distributed of steel fibre are placed to overcome the brittle of concrete and provide more strength and durability. This paper represent the effect of fibres and study the strength of reinforced concrete of M30 grade with 2% of steel and glass fibre which shows the enhanced properties compare to normal.

Keywords : Fibre Reinforced Concrete, Glass Fibre, Steel Fibre, Compressive Strength, Split Tensile Strength.

I. INTRODUCTION

As we know that the concrete is manmade and most widely used material globally for construction in many developing and developed countries in related to construction. It has several desirable properties like high compressive strength, stiffness and durability under normal usual environmental factors while at same time concrete found to be brittle and weak in tension. Fibre Reinforcement Concrete (FRC) combine the high compressive strength properties of cement mortars with significantly increased impact, flexural and tensile strength imparted by the fibre reinforcement. If fibre is not used in concrete there may be chances of development of cracks due to drying shrinkage, plastic shrinkage and other reason of chances in volume of concrete.

In this experimental investigation Portland Pozzolana Cement (PPC – 53 grade), Carbon Steel Fibre and Glass fibre are used. Fibre Reinforcement Concrete is a composite material essentially consisting of conventional concrete or mortar reinforced by randomly oriented, short continuous and discrete fibres of specific geometry. It is a parts of reinforcing material usually described by aspect ratio. Aspect ratio is specified by volume fraction. Fibres are added to improve the strength parameters of the concrete as reinforcement effective to improve the flexural strength and compressive strength of concrete. In ancient years, researchers have realized the benefits of combining fibres, in terms of obtaining synergy and improving the response of composite material. Little progress was made in the development of this material till 1963, when Ramauldi J.P. and Batson G.B. published their classical paper on the subject. In the early 1970's FRC has been in prevent construction.

II. METHODS AND MATERIAL

The main theme of this experiment investigation is to determine the strength parameters such as compressive strength, split tensile strength of concrete and design to meet the requirements of M_{30}

grade of concrete mix with steel fibre of 2% by volume of concrete and alkalis resistance glass fibre of 2% by weight of cement.

1. In first stage, properties of various materials used in mix are studied.
2. In second stage mix design is carried out preparation of the mold.
3. Examine the strength characteristics (compressive strength and split tensile strength) of concrete modified with addition of steel and glass fiber of 2%.
4. Compare the effect of various type of fibers for efficient performance intersects of strength, workability and durability.
5. Final step is about comparing results.

Compressive Strength

Compressive strength test is the strength of concrete is usually defined and determined by the crushing strength of 150mm×150mm×150mm of an age of 7,14 and 28 days. According IS 516-1959. The steel fibres and glass fibres included at the rate of 2%. This solid is provided in the mould and altered legitimately so, as not to have any voids. Following 24 hours these moulds are evacuated and test examples are placed in water for curing. Load at the disappointment isolated by zone of example gives the compressive quality of cement.

Compressive Strength (Mpa) = Failure load/Cross Sectional Area.

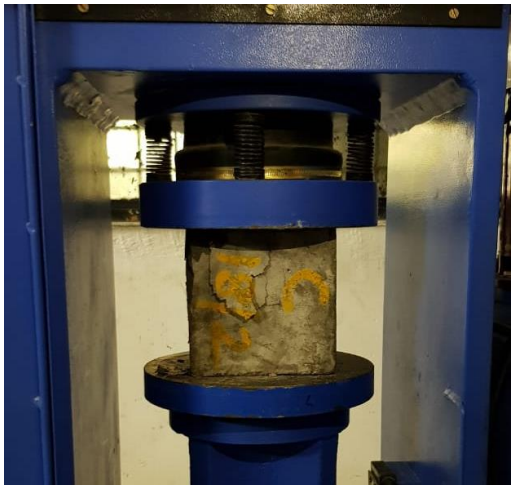

Fig – 2.1 Compressive strength test

Split Tensile Strength

To locate the split elasticity the barrels were placed in the moulds of measurements 200mm length and 150mm diameter across with M30 grade of concrete. Set of the test example by adding glass fibre by including the glass fibre at the rate of 2% were additionally included while passing the barrels the compaction is done utilizing the table vibrator. Finally the top layer of the example is completely labelled and very much wrapped up from time of casting 24 hours the barrels were demolded and were kept for curing in curing time for 28 days. After 28 days curing is done these examples have been tried in pressure testing machine. The split rigidity is figured as takes after

Split tensile strength (Mpa) = $2p/\pi Dl$

p = Failure Load

D = Diameter of cylinder

l = length of cylinder.

Fig – 2.2 Split tensile strength test

III. RESULTS AND DISCUSSION

TABLE–1. Compressive strength

Sn.	Mix Proportion (ratio)	Fibres	Workability	Area of 3 – cubes		
			Slump (mm)	Compressive strength (Mpa)		
				7 days	14 days	28 days
1.	1:1.7:2.08	No	75	17.0	21.3	35.7
2.	1:1.7:2.08	Glass	70	13.3	22.8	35.5
3.	1:1.7:2.08	Steel	72	20.0	26.5	42.5

The above Table-1 and Table-2 shows the compare between Normal specimen, Glass fibre and Steel fibre. As per test we get later result by using 2% of steel fibre and glass fibre comparing to normal specimen. Here, in this paper the test has been done for 7-days, 14-days and 28-days curing.

TABLE – 2. Tensile strength

Sn.	Mix Proportion (ratio)	Fibres	Workability	Area and Diameter of Cylinder		
			Slump (mm)	Tensile strength (Mpa)		
				7 days	14 days	28 days
1.	1:1.7:2.08	No	75	1.54	1.8	3.2
2.	1:1.7:2.08	Glass	70	1.1	2.0	4.5
3.	1:1.7:2.08	Steel	72	2.3	3.4	5.5

IV. CONCLUSION

The main theme of this experiment is study to quantity of the effect of the additional of Glass fibre, Steel fibre and Normal specimen by examine physical and mechanical properties of including compressive strength and split tensile strength. We get high strength of steel fibre as compare to normal specimen. The highest compressive strength is 42.5 Mpa and the highest split is 5.5 Mpa and Similarly, using Glass fibre, we didn't get highest strength but we got the smooth surface of concrete and fineness of concrete etc. thus we increase the properties of concrete by using 2% of steel fibre and Glass fibre and get better result comparing to normal specimen in 28 days.

V. REFERENCES

[1]. Alan J. Brookes, "Cladding of Building"

[2]. Arnon Bentur and Sidney Mindess, "Fibre Reinforced Cementations Composites", Second Edition 2007, Chapter 8, (pp278).

[3]. Sikder, P.K, Gupta, S and Kumar, S. (2004), "Application of Fiber as Secondary Reinforcement in Concrete", NSW & CW, December. [5] MoRTH Specification for Road and Bridge Works (2001), Fourth Revision.

[4]. Application and properties of fibre cocncrete Author :- Amit Rai and Dr.Y.P Joshi [2]. Comperssive

[5]. Behavior Of Steel Fibre Reinforced Concrete Author :- R.D.Neves and J.C.O. Fernandes de Almedia

[6]. Eng. Pshtiwan N. Shakor, and Prof. S. S. Pimplikar (2011) "Glass Fibre Reinforced Concrete Use in Construction", International Journal of Technology and Engineering System (IJTES), Jan –March 2011- Vol.2.No.2.

[7]. ShrikanntHarle "Glass Fiber Reinforced Concrete & Its Properties" International Journal of Engineering Sciences & Research Technology Harle, 3(1), January 2014. [2] Amit Rai, Dr. Y.P Joshi "Applications and

[8]. Properties of Fiber Reinforced Concrete" International Journal of Engineering Research and Applications Volume 4, Issue 5 (Version 1), May 2014.

[9]. Dr. P. Perumal and Dr. J. Maheswaran, "Behavioural study on the effect of AR-Glass Fibre reinforced concrete", NBW & CW October 2006, (pp 174-180).

[10]. Upendra Varma and A.D. Kumar (2013), "Glass Fibre Reinforced Concrete", International Journal of Engineering Research and Applications, Vol. 3, Issue 5, pp.1914-1918.