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Experimental Study on Bendable Concrete using Super Plasticizer and Recron 3s Fibre

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ABSTRACT

Concrete is one of the most extensively used construction material all over the world. Many scientists and researchers are in quest for developing alternate construction material that are environment friendly and contribute towards sustainable development. Huge amount of rubber tire waste is being generated day by day which creates the disposal problems and has many environmental issues as this scrapped rubber waste is an elastic material having less specific gravity, energy absorbent material can be used as a replacement material for obtaining lightweight concrete. The scrapped rubber can not be discharge of easily in the environment as its decomposition takes much time and also produces environmental pollution .In such a case the reuse of rubber would be a better choice. In order to reuse rubber wastes, it is added to concrete to enhance the properties of concrete. The objective of this study is to test the properties of concrete by replacing the waste rubber chips partially to the coarse aggregate in concrete with different percentage as 10%, 20% and 30% on volume basis. By literature review it is observed that it helps to reduce cracks and also helps to increase the durability and ductility of concrete. Because of rubber compressive strength of concrete decreases. So, to increase the compressive strength we are adding glass fiber to the weight of cement in concrete at percentage 0.5%, 1% and 1.5%. The glass fiber having high tensile strength, good thermal conductivity and also good chemical resistance.

Keywords : Reinforced Concrete, Workability, Compressive Strength, Tensile Strength, Bond Strength

I. INTRODUCTION

Conventional concretes are almost un-bendable and have a strain capacity of only 0.1 percent making them highly brittle and rigid. This lack of bendability is a major cause of failure under strain and has been a pushing factor in the development of an elegant material namely, bendable concrete also known as Engineered Cementitious Composites abbreviated as ECC. This material is capable to exhibit considerably enhanced flexibility. A bendable concrete is reinforced with micromechanically designed polymer fibres. ECC is made from the same basic ingredients as conventional concrete but with the addition of high-range water reducing (HRWR) agent is required to impart good workability. However, coarse aggregates are not used in ECCs (hence it is a mortar rather than concrete). The powder content of ECC is relatively high. Cementitious materials , such as fly ash , silica fume , blast furnace slag , silica fume etc. may be used in addition to cement to increase the paste content. Additionally, ECC uses low amounts, typically 2% by volume, of short, discontinuous fibres. ECC incorporates super fine silica sand and tiny Recron 3s fibres covered with a very thin (nanometer thick), slick coating. This surface coating allows the fibre to begin slipping when they are over loaded so they are not fracturing.

II. PROBLEM STATEMENT

1. Bendable Concrete can bring a revolution because of its some special quality such as flexibility, self-healing, lighter weight, etc. In some countries such as Japan, Korea, U.S.A. etc the flexible concrete is used in many structures. But in India, it is still an unexplored composite and requires thorough research for its use.
2. Concrete is widely used in today's construction industry. It can take the compressive load very effectively. But the main problem with traditional concrete is that it cannot take much tensile stresses. It fails under the tensile load. The flexible concrete seems to be a good solution for this problem, if it can give the desired flexural strength.

III. Objectives

To see the effect of fibres and additives in concrete following objective need to be achieved. The objectives are:

1. To evaluate the effect of addition of Recron 3s fibers in concrete by maintaining constant water-cement ratio and improving its binding property.
2. To determine the effect of addition polycarboxylate based super plasticizer in concrete to improve compressive strength and durability.
3. To determine the behavior of ECC-bendable concrete under Flexure.
4. To obtain and compare the flexural strength of plain concrete and bendable concrete.
5. To reduce self weight of concrete.

IV. Scope of project work

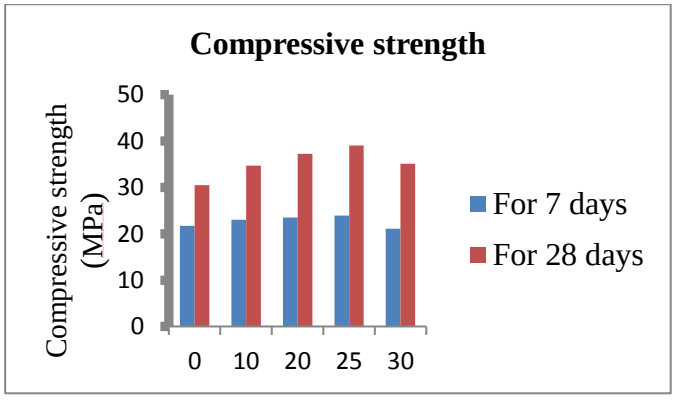
1. To improve compressive and flexural strength by using recron 3s and super plasticizer.
2. Finding flexural strength and compressive strength of various specimens.
3. Comparing the cost of ECC with the conventional concrete.
4. Applications of ECC.

V. RESULTS AND DISCUSSION

A. *Compressive strength of concrete cube*

Compressionstrength test	Curing period	Ultimate load Applied (KN)	Area (mm^2	Compressive strength (N/mm^2)
Conventionalconcrete	7^{th} day	585	22500	26
	28^{th} day	904	22500	40.2
Flexible concrete	7^{th} day	612	22500	27.2
	28^{th} day	936	22500	41.6

Comparison of flexible concrete and conventional concrete cubes



B. Flexural strength of Concrete slab

Flexural strength (N/mm2)			
Slab size	Curing period	Flexible concrete	Conventional concrete
700 x 150 x 30 mm	7 th days	3.76	3.03
	28th day	5.56	4.24
700 x 150 x 60 mm	7 th days	3.81	3.20
	28th day	5.92	5.15

VI.CONCLUSION

This experimental study was carried out to determine the mechanical properties of adding poly vinyl alcoholic fiber in concrete. In this regards, comparison of compression strength and flexural strength of the flexible concrete is higher than the conventional cubes and slabs. The mix proportion of flexible is derived in this experimental study. The reason behind the strengths of flexible concrete is due to the presence of PVA fiber as reinforcement. The strength of conventional cubes and slabs is low, since it is not reinforced. Therefore it is proved that the flexible concrete is more strength than the conventional concrete and it is more flexible so that it resists cracks and acts as more efficiency in seismic regions.

I. REFERENCES

[1]. Sagar Gadhiya, Patel T N and Dinesh Shah(2015) “Parametric study on flexural strength on ECC 2015 ijscer vol:4 no:5

[2]. S.Z. Qian, J. Zhou, E. Schlangen“Influence of curing condition and pre cracking time on the self healing behaviour of Engineered Cementitious Composites” Journal of Cement & Concrete Composites 32 (2010) pp. 686-693.

[3]. Jian Zhou, Shunzhi Qian, Guang Ye, Oguzhan Copuroglu, Klaas van Breugel, Victor C. Li,” Improved fibre distribution and mechanical properties of engineered cementitious composites by adjusting the mixing sequence,”Jounal of Cement & Concrete Composites” 34(2012)pp.342–348

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