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TO STUDY THE EFFECTS ON STRENGTH OF CONCRETE TILES WITH ADDITION OF CHOPPED GLASS FIBRES

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Abstract: The effect of glass fibre on flexural strength, split-tensile strength and compressive strength was studied for different fibre content on M-20 grade concrete designed as per IS 10262.The maximum size of aggregates used was 20mm. To study the effect on compressive strength, flexural strength, split-tensile strength 6 cubes,6 prisms and 6 cylinders were casted and tested After that a practical application of GFRC in the form of cement concrete tiles was taken into consideration and no special technique was used to produce this tiles. The thickness of the tiles was 20mm and maximum size of aggregates used was 8mm.The water cement ratio was kept consistent and the admixture content was varied from .8 to 1.5 percent to maintain slump in between 50mm to 100mm.The mix proportion used was 1:1.78:2.66. The size of short fibres used were 30mm and the glass fibres were alkali resistant. The effect of this short fibres on wet transverse strength, compressive strength and water absorption was carried out. Six full sized tiles 400mm*400mm*20mm were tested and the results recorded. Pulse velocity tests was also conducted.

I. INTRODUCTION

One of the most important building material is concrete and its use has been ever increasing in the entire world. The reasons being that it is relatively cheap and its constituents are easily available, and has usability in wide range of civil infrastructure works. However concrete has certain disadvantages like brittleness and poor resistance to crack opening and spread.Concrete is brittle by nature and possess very low tensile strength and therefore fibres are used in one form or another to increase its tensile strength and decrease the brittle behaviour. With time a lot of experiments have been done to enhance the properties of concrete both in fresh state as well as hardened state. The basic materials remain the same but superplasticizers, admixtures, micro fillers are also being used to get the desired properties like workability, Increase or decrease in setting time and higher compressive strength. Fibres which are applied for structural concretes are classified according to their material As Steel fibres, Alkali resistant Glass fibres (AR), Synthetic fibres, Carbon, pitch and polyacrylonitrile (PAN) fibres.

Glass Fibre Reinforced Concrete

Glass fibre reinforced concrete (GFRC) is a cementitous composite product reinforced with discrete glass fibres of varying length and size. The glass fibre used is alkaline resistant as glass fibre are susceptible to alkali which decreases the durability of GFRC. Glass strands are utilized for the most part for outside claddings, veneer plates and different components where their reinforcing impacts are required during construction. GFRC is stiff in fresh state has lower slump and hence less workable, therefore water reducing admixtures are used. Further the properties of GFRC depends on various parameters like method of producing

II. MATERIALS AND METHODS

Concrete : Concrete is the most widely used construction material. The basic materials of concrete are Portland cement, water, fine aggregates i.e. sand and coarse aggregates. The cement and water form a paste that hardens and bonds the aggregates together. Concrete in fresh state is plastic and can be easily moulded to any shape, as time passes it hardens and gains strength. The initial gain in strength is due to a chemical reaction between water and C2s and latter gain in strength is due to reaction between C3s and water. Concrete is produced by either following nominal mix proportions in which the mix proportions are fixed as per grade of concrete required or mix design proportions, latter produces more economical concrete.

Cement Cement is an extremely ground material having adhesive and cohesive properties which provide a binding medium for the discrete ingredients. The processes used for manufacture of cement can be classified as dry and wet.. The cement commonly used is Portland cement, it is also defined as hydraulic cement, i.e. a cement which hardens when it comes with water due to chemical reaction but there by forming a water resistant product

Fine Aggregate : The size of aggregates used in concrete range from few centimetres or more, down to a couple of microns. Fine aggregates is the aggregate most of which passes through a 4.75mm IS sieve and contains just that much coarser material as allowed by the IS details. The fine aggregate used for the experimental programme was obtained from river bed of Koel.

Coarse Aggregate : The coarse aggregates may be crushed gravel or stone obtained by the crushing of gravel or hard stone; uncrushed gravel or stone resulting from natural disintegration of rock and partially crushed gravel or stone obtained as a product of the blending of the naturally disintegrated and crushed aggregates. In our case crushed stone was used with a nominal maximum size of 20 mm and specific gravity of 2.78.

Water :Water is the one most essential element of cement. Water assumes the vital part of hydration of concrete which frames the coupling lattice in which the dormant totals are held in suspension medium until the grid has solidified, furthermore it serves as the lubricant between the fine and coarse aggregates and makes concrete workable.

Fiber :Fibre is a natural or synthetic string or used as a component of composite materials, or, when matted into sheets, used to make products such as paper, papyrus, or felt. Concrete is brittle by nature and is weak in flexure as well as direct tension therefore in order to improve this properties fibres are added to concrete.

III. EXPERIMENTAL SETUP

Compressive strength: The most important property of concrete is its compressive strength and durability. Concrete is mostly used in construction where load transferred is mostly via compressive strength. In order to check the effect of fibres on the compressive strength of concrete 150mm cubes were cast and tested .

Split Tensile Strength :Concrete may be subjected to tension in very rare cases and is never designed to resist direct tension. However, the load at which cracking would occur is important and needs to be determined. The tensile strength of concrete as compared to its compressive strength is very low and is found to be only 10-15 % of the compressive strength. There are various factors which influence the tensile strength of concrete like aggregates, age, curing, air-entrainment and method of test

Flexural Strength :Flexural strength is also a measure of the tensile strength of concrete. In practical concrete may not be subjected to direct tension but it is subjected to flexure in many cases particularly in beams which is a flexural member. Flexural strength is also referred to as modulus of rupture.

IV. CONCLUSIONS

In this experimental program the effect of short discrete glass fibers on the compressive,split tensile strength and flexural strength of concrete was studied. The effect of glass fibres on cement and concrete tiles which are produced by vibration method are also studied. The properties studied are compressive strength, wet transverse strength and water absorption .The concrete mix gets harsher and less workable with increase of fiber content therefore use of admixture become necessary. However even after giving dosage of admixture as high as 1.5% proper workability could not be obtained and some segregation was observed. Therefore it was not possible to go beyond 0.7% fiber content. The various observation based on the experimental result are as follows:

1. The compressive strength of concrete without admixture is not affected by the presence of short discrete glass fibers with fibre content in the range 0.1 to 0.3 % of fiber content by weight of concrete.
2. The split tensile strength of concrete increases with the addition of glass fibers.
3. The flexural strength of concrete increases with increase in fiber content and as such the tension carrying capacity of concrete may increase in flexure
4. The wet transverse strength of tiles increases and the increase has been found with addition of fibers 5. The water absorption of the concrete also decreases with increase in fiber content.
6. The compressive strength of concrete with admixture was not affected upto 0.4 % fiber content but decreased with the presence of higher amount of fibers .

REFERENCES

[1] Cook D.J., Pama R.P., Weerasingle H.L.S.D. “Coir fibre reinforced cement as a low cost roofing material”. Build Environ 1978;13(3):193–8.

[2] Perez-Pena .M and Mobasher .B, “Mechanical properties of fiber reinforced lightweight concrete composites ”. Cement and Concrete Research, Vol. 24, No. 6, pp. 1121-1132, 1994

[3] Brandt AM. “Cement-based composites: materials, mechanical properties and performance”. London: E&FN Spon; 1995. p. 470 4. Nakamura H, Mihashi H. “Evaluation of tension softening properties of fiber reinforced cementitious composites.” Fracture Mechanics of Concrete Structures 1998; I:499e510.

[4] Mirza F.A., Soroushiannd P. “Effects of alkali-resistant glass fiber reinforcement on crack and temperature resistance of lightweight concrete.” Cement and Concrete Composites 2002;24(2):223–7 6. Robert S.P. Coutts .“A review of Australian research into natural fibre cement composites” Cement & Concrete Composites 27 (2005) 518–526

[5] Khosrow Ghavami. “Bamboo as reinforcement in structural concrete elements” .Cement & Concrete Composites 27 (2005) 637–649 8. Huang Gu, Zuo Zhonge “Compressive behaviour of concrete cylinders reinforced by glass and polyester filaments”. Materials and Design 26 (2005) 450–453

[6] Andrzej Brandt .M “Fibre reinforced cement-based (FRC) composites after over 40 years of development in building and civil engineering”. Composite Structures 86 (2008) 3–9

