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Innovation The Research Concept

Study on The Strength of Fibre Reinforced Concrete

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Abstract

Concrete is the most popular man made construction material composed of cement, fine aggregates and coarseaggregates mixed with water which harden swith time. It has low tensile strength and high compressive strengh, So to increase the tensile and flexural strength of concrete, different fibres will be added as per requirements. Nowadays, plasticis the most important and harmful material of our society.Here, in this paper plasticis use das fibre. Various testing of concrete is done and observe the behavioral changes occur due to plastic fibre. The aim of this paper is to make the plastic fibre concrete usable as per our requirements, so it can get the market value. With this use, plastic cannot harm our society and also clean India mission will be successful.

Keywords: Fibre Reinforced Concrete, Fibre, Plastic Recycling, Compressive Strength, Composite, Reinforced Concrete.

Introduction

Concrete is the most popular man made construction material composed of cement, fine aggregates and coarse aggregates mixed with water which hardens with time. It has low tensile strength and high compressive strength. Regular concrete is therefore normally reinforced with steel reinforcing bars.For many applications, it is becoming increasingly popular to reinforce the concrete with small, randomly distributed fibers.Their main purpose is to increase the energy absorption capacity and toughness of the material, and also to increase tensile and flexural strength of concrete.

Generation of plastic waste is one of the fastest growing areas. Every year more than 500 billion plastic bags are used (nearly one million bag per minute). Hundreds of thousands of sea turtles, whales and other marine mammals die every year from eating discarded plastic bag for mistaken food. On land many animals suffer from similar fate to marine life. Collection, hauling ad disposal of plastic bag waste creates an additional environmental impact. In a landfill or in environment, Plastic bags take up to 1000 year to degrade. This paper aims to use waste plastic in concrete as a partial replacement of Coarse aggregate. For Utilization of waste plastic. To control the environmental pollution.To produced Light weight concrete.

Consistency of Cement

The objective of conducting this test is to find out the amount of water to be added to the cement to get a paste of normal consistency. 500 grams of cement was taken and made into a paste with a weighed quantity of water (% by weight of cement) for the first trial. The paste was prepared in a standard manner and filled into the vicat mould plunger, 10mm diameter, 50mm long and was attached and brought down to touch the surface of the paste in the test block and quickly released allowing it to sink into the paste by its own weight. The depth of penetration of the plunger was noted. Similarly trials were conducted with higher water cement ratios till such time the plunger penetrates for a depth of 33-35mm from the top. That particular percentage of water which allows the plunger to penetrate only to a depth of 33-35mm from the top is known as the percentage of water required to produce a cement paste of standard consistency.

Initial Setting Time

The needle of the Vicat apparatus was lowed gently and brought in contact with the surface of the test block and quickly released. It was allowed to penetrate into the test block. In the beginning, the needle completely pierced through the test block. But after sometime when the paste starts losing its plasticity, the needle penetrated only to a depth of 33- 35mm from the top. The period elapsing between the time when water

is added to the cement and the time at which the needle penetrates the test block to a depth equal to 33-35mm from the top was taken as the initial setting time.

Experieriment alanalysis

The type of cement used was Portland Pozzalona Cement.

S.No	Description	Result
1	Specificgravity	3.15
2	Fineness(bysieveanalysis)	2%
3	Consistency	31%
4	Initialsettingtime	110minutes

Table1:Test results of cement

In this it shows that initial setting time is 220 mints and consistency of the cement is 31%.

Coarse Aggregate

20mm down size aggregate was used.

S.No	Description	Values
1	Specific gravity	2.68
2	Bulk density	1642.45
3	Surface moisture	0.08%
4	Water absorption	1%
5	Fineness modulus	6.98

Table 2: Test results of coarse aggregate

Mould number	Specific gravity	Average sp gravity
1	2.74	
2	2.80	
3	2.65	2.74
4	2.70	
5	2.68	

Table 3: Specific gravity :(NRC)

The average specific gravity of fibre reinforced concrete is o.9, whereas normal concrete is 2.74.

Mould number	Specific gravity	Average sp gravity
1	0.9	
2	1.00	
3	1.1	0.9
4	0.70	
5	0.8	

Table 4: Specific gravity of PRC

Mould number	Load applied in (KN)	Compressive strength (N/sq.mm)
1	27	27.0
2	280	28.0
3	245	24.5
4	260	26
5	270	27

Table5: Compressive strength test of FR Cafter 28 days (15%steel)

Mould number	Load applied in (KN)	Compressive strength (N/sq.mm)
1	270	27
2	290	29
3	300	30
4	300	30
5	270	27

Table 6: Compressive strength test of PR Cafter 28 days

Mould number	Load applied in (KN)	Compressive strength (N/sq.mm)
1	200	20
2	250	25
3	300	30
4	150	15
5	150	15

Table 7: Compressive strength test of FR Cafter 28 days (30% Plastic)

S.NO.	Property	NCA	PCA
1	Specific gravity	2.74	0.9
2	Crushing value	28	2
3	Density	3.14	0.81

Table 8: Physical Properties NCA and PCA

S.No.	block	14 days compressive strentgh
1.	NCA (naturalcoarseagg.)	12.5kn/mm2
2.	PCA (30%plastic)	15kn/mm2

Table 9: comparison of compressive strength at 14 days of NCA and PCA

According to the Indian standard specifications the property of aggregates such as specific gravity, aggregate crushing value and density we redetermined, and comparing the properties of aggregate for both NCA and PCA. It is observed that the specific gravity and density for PCA is much lower than NCA which offers alight weight concrete. A lower crushing value indicates the complexity with which a PCA concrete could be crushed under compressive stresses.

` In the present investigation it is found that optimum upto 30-40% by replacing of waste plastics there is aslight deviation of compressive strength. From the test results it was observed that the compressive strength value of the concrete mixed creased with the addition of waste plastics more than 50% of waste plastics. So we can add waste plastics in concrete blocks so this will help store use of plastics in concrete blocks.

Aim of the Study

This paper aims to use waste plastic in concrete as partial replacement of coarse aggregate.

Conclusion

1. Looking into the above aspects, the analysis concluded that the waste plastics can be used in the cement concrete mix.
2. This modified cement concrete mix is applicable in the construction of rigid pavements.
3. The compressive strengths of modified cement concrete are as equal as plain cement concrete. The optimum modifier content of waste plastics is found to be 30% for solid blocks.
4. The cost of construction will reduce and also helps to avoid the general disposal technique of waste plastics namely land filling and incineration which have certain burden on ecology.
5. It is identified that plastic waste can be disposed by using them as construction materials.
6. Since it is used to replace the coarse aggregate.

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