International Journal of Engineering Research-Online
A Peer Reviewed International Journal
Articles available online http://www.ijoer.in; editorijoer@gmail.com

Vol.5., Issue.1., 2017
January-February

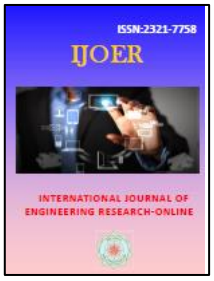
RESEARCH ARTICLE

ISSN: 2321-7758

EXPERMENTAL INVESTIGATION ON WASTE PLASTIC (PET BOTTLE) FIBRE REINFORCED CONCRETE

DINESHRANJAN.S[1], V.AISHWARYALAKSHMI[2]

[1]U.G Student, B.E Civil Engineering, Jaya Engineering College, Chennai, Tamil Nadu, India University
[2]Assistant Professor, Civil Department, Jaya Engineering College, Chennai, Tamil Nadu, India



ABSTRACT

The aim of this study to carry out the "EXPERMENTAL INVESTIGATION ON WASTE PLASTIC (PET BOTTLE)FIBRE REINFORCED CONCRETE". The addition of fibre into concrete has been found to improve several of its properties like compressive strength, tensile strength, cracking resistance, impact, wear and tear, ductility,fatigue,etc. many types of fibres like carbon fibres, glass fibres can be used in fibre reinforced concrete. waste plastic can also be used as fibres. The disposal of waste plastic is resulting in environmental pollution. Plastic is a non-boidegradable material and it neither decays nor degenerates in water or in soil. On the other hand it pollutes the water and soil. plastic if burnt releases many toxic gases which are very dangerous to health, such plastics can be used in concrete in the form of fibre to impart some additional desirable qualities to the concrete. This paper presents the result of waste plastic fibre reinforced concrete(WPFC) for 1%,2%,3%,4% &5% waste plastic fibre. The result WPFC is compared with ordinary cement concrete

INTRODUCTION

This document is a template. An electronic copy can be do Polyethylene Terephthalate commonly abbreviated PET, PETE, or the obsolete PETP or PET-P is a thermoplastic polymer resin of the polyester family and is used in synthetic fibers, beverage, food and other liquid containers. Thermoforming applications and engineering resins often in combination with glass fiber. The majority of the world's PET production is for synthetic fibers (in excess of 60%), with bottle production accounting for around 30% of global demand. are provided. The formatter will need to create these components, incorporating the applicable criteria that follow. In the context of textile applications .PET is referred to by its common name, "polyester", whereas the acronym "PET" is generally used in relation to packaging. polyester makes up about 18% of world polymer production and is the third-most-produced polymer. PET consists of polymerized units of the monomer ethylene terephthalate. Depending on its processing and thermal history, polyethylene terephthalate may exist both as an amorphous and as a semi-crystalline polymer. The semi-crystalline material might appear transparent or opaque and white depending on its crystal structure and particle size. Its monomer can be synthesized by the esterification reaction between terphthalic acid and ethylene glycol with water as a by-product or by trans esterification reaction between ethylene glycol and dimethyl terephthalate with methanol as a by product. polymerization is through a poly condensation reaction of the monomers with water as the byproduct.

RESEARCH SIGNIFICANCE

The main objective of present investigation is

- To explore the utilization of pet bottles fibre as admixture in concrete.
- To compare the compressive strength of WPFRC with OPC
- To compare the split tensile strength of WPFRC with OPC

SELECTION OF MATERIALS, TESTS AND MIX DESIGN

A. Cement: In this experiment investigation OPC was used for all concrete mixes, the cement used was fresh and without lumps. The testing of cement was done as per IS 456 and conforming to IS4031(part 1):1996. The specific gravity of cement was found to be 3.15.

B. Water: Portable tab water is used for preparation of specimens and curing of specimens

C. Coarse Aggregates: Locally available coarse aggregate passing from 20mm sieve and conforming IS 383-1972 were used in present work. the specific gravity of coarse aggregate was found 2.74.

D. Fine Aggregates: As per IS 383-1970, table4 sand used for experimental program was locally produced and was conforming zone-II. The specific gravity of fine aggregate was found to be 2.6.

E. Plastic Fibre: Low density polyethylene is used as fibres. Generally these made by cutting the water bottles in to laminar shaped fibres are used and thicknesses of fibres are varying from 0.125 to0.150mm. By trail mix results 0.5% (by the weight of cement) is added in the concrete of present experimental work.

F. Admixture: Commercially available complots SP-430 super plasticizer issued to enhance the workability of fresh concrete.

G. Mix design: The mix was designed as per IS 10262:2009 for M40 grade concrete with 0.4 water cement ratio. Concrete mixes are prepared by partial replacement of natural sand by manufactured sand with different percentages (0%, 20%, 40%, 60%, 80%, 100%) respectively and adding fixed percentage of plastic fibres (0.5% of weight of cement) for every mix.

H. Test specimens and test procedure: The 150mm size concrete cubes, cylinder of size 150mm diameter and 300mm height and concrete beam of size 100mm×100mm×500mm were used as test specimens to determine the compressive strength, split tensile strength and flexural strength respectively.

Result and Discussion

The compressive strength result of different mixes are given by table 1 and figure1 (x-axis represents mix combination and y-axis represent load). In the present investigation was found that the combination by adding pet fibres against cement quantity up to 3% gave compressive strength increasing successively and more than controlled mix concrete. The compressive strength of waste plastic fibre reinforced concrete is increase up to 3% replacement and decreased when added more than 3%. Similarly the split tensile strength result of different mixes is given by table 2. In split tensile strength it was found that the strength is increasing with the increase of waste plastic fibre reinforcement concrete up to 5% and more than controlled mix concrete.

Table 1: Test Result of compressive strength test

S.No	Mix Combination	Load (KN)	28days compressive strength (Mpa)
1	Norminal mixer	665.1	29.56
2	1% of plastic fibre	687	30.56
3	2% of plastic fibre	698.4	31.04
4	3% of plastic fibre	707.2	31.43
5	4% of plastic fibre	474.8	21.1
6	5% of plastic fibre	360	16

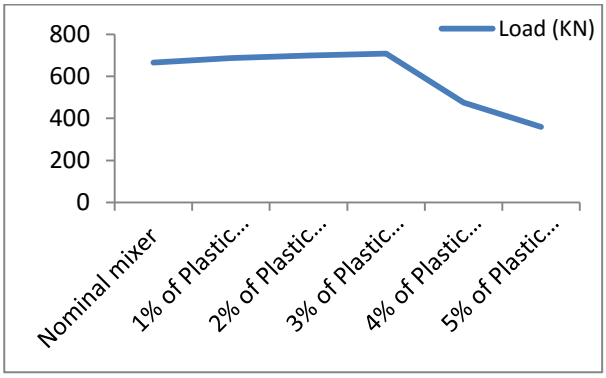


Figure 1. Test Result of compressive strength Test

S.No	Mix Combination	Load 2p (KN)	Length (L)mm	Split tensile strength N/mm^2	dia (mm)
1	nominal mixer	150	100	2.39	200
2	1% of plastic fibre	170	100	2.71	200
3	2% of plastic fibre	180.16	100	2.87	200
4	3% of plastic fibre	198.53	100	3.15	200
5	4% of plastic fibre	213.36	100	3.4	200
6	5% of plastic fibre	231.02	100	3.71	200

CONCLUSIONS

Based on the test results and analysis, the following conclusions were made.

- The combinations obtained by adding pet fibre against cement quantity up to 3% gave compressive strength increasing successively and more than the controlled mix concrete
- The combination obtained by adding of pet fibre cement quantity with 1% gave more compressive strength than controlled mix and gave splitting tensile strength 2.450N/mm2. This result shows splitting tensile strength increased than controlled mix
- The combination obtained by adding of pet fibre against cement quantity with 2% gave more compressive strength than 1%pet fibre concrete and gave splitting tensile strength 2.556N/mm2.
- The combination obtained by adding of pet fibre against cement quality with 3%gave more compression than 2% pet fibre concrete and gave splitting tensile strength 2.890N/mm2/
- The combinations obtained by adding of pet fibre against cement quantity with 4%gave more compressive strength than 3% pet fibre concrete and gave splitting tensile strength 3.06N/mm2.
- The combination obtained by adding of pet fibre against cement quantity with 5% gave less compressive strength than 4% pet fibre concrete and gave splitting tensile 3.120 N/mm2.
- Finally concluded that the compressive strength of WPFRC is increased upto 3% replacement and decreased when added more than 3%
- The split tensile strength is increasing with the increase of waste plastic fibre reinforcement upto 5%.

REFERENCES

[1] Ho N.Y. and Yogesh Chhabra “Use of glass-fibre reinforced plastics for structural strengthening of reinforced concrete” The Indian Concrete Journal, Vol.3, 1999, pp.219-224.

[2] Santhakumar.A.R. “Concrete Technology” Oxford University Press, New Delhi,2007.

[3] IS 2386-1963 Indian standards test methods for aggregate for concrete.

[4] MahendraR.Chitlange and Prakash S.Pajgade “Strength appraisal of artificial sand as fine aggregate in SFRC” ARPN Journal of Engineering and Applied Science, Vol. 5, No.10, 2010, pp. 34-38.

[5] Sawant.B, Kumthekar.M.BAnd Sawant.S.G “Utilization of Neutralized Industrial waste in concrete” International Journal of inventive Engineering and Sciences (IJIES), Vol.1, 2013, pp.55-59.

[6] Priyanka .A.Jadhav, Dilip K. Kulkarni “Effect of replacement of natural sand by manufactured sand on the properties of cement mortar” International journal of civil and structural engineering , Vol. 3, No 3, 2013, pp.46-51.