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A Review on Strength Variation in Concrete by using Recycle (PET) Bottle Fibre

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Abstract: ***A fibre reinforced concrete is a mixture having the ingredient cement, sand, aggregate with recycle PET Fibre in desired shapes designed. Polyethylene Terephthalate (PET) bottle are creating non-biodegradable waste in which are hazardous to environment. we have tested on mechanical properties of concrete with addition of designed shape fibre in various quantity and mechanical property viz. compressive strength, flexural strength of beam and cube casted with incorporate on different grades of concrete. PET bottle Can be used as strategic to product more economic and sustainable building materials in the future as strength.***

Keywords: fibre reinforced concrete, Polyethylene Terephthalate, non-biodegradable, mechanical properties.

I. INTRODUCTION

Polyethylene Terephthalate (PET) plastic waste is collected from soft drinks in large quantity. Polyethylene Terephthalate (PET) as a elastic material we have use it for flexural as well as compressive strength purpose for improvement of mechanical properties of concrete. As this plastic waste is ease to be available. we have some designed two irregular fibre of size 40mm x 10mm in zig Zac pattern two faced ends. So as addition of fibre to improve the mechanical strength of concrete. We have focused on properties of concrete on base of compressive strength, flexural strength and tensile strength behaviour on field. It can be used in airport runway, rigid concrete pavement, huge structures as to reduce non-biodegradable (PET) waste in concrete. Polyethylene Terephthalate (PET) has many beneficial properties as single. India has major production of Polyethylene Terephthalate (PET). Concrete is a universal material used for construction with inclusion of material which used is cement, fine aggregate (sand), coarse aggregate as composite material . the use of concrete is most important as construction matter of any structure. there have been many experimentations done to improve strength of conventional concrete which improve the age, capability & technicality. generally concrete has mix design range from M15 to M45. this decides the proportionality of addition of ingredients like cement, sand, aggregate which is followed by water cement ratio. further this is compared on strength viz. compressive strength, flexural strength, split tensile strength.

Disadvantages of concrete is brittle material, Concrete has less tensile strength as compare to any other binding material used in construction field. As construction material it is not enough tough. It require more duration for moulding into formwork shape. Its has less specific strength without reinforcement Polyethylene Terephthalate (PET) is the most commonly used thermoplastic polyester. Its chemical formula is (C10H8O4) n. Its generally used for packaging of soft drinks and carbonated water. Due to addition of PET fibre we improve the quality and age of concrete as its non-biodegradable material. we have cut it desired design by us of dimension of 4mm x 10mm (as per figure). It is tough enough to be stable dimensionally as well as flexible for use in concrete. it is truly amazing sustain material with less value as scrap therefore affordable to be used recycled material in concrete as construction material.

II. LITRETURE REVIEW

A. *Nibudey, Nagarnaik et.al. (2013):* they stated that model for compressive strength of PET fibre reinforced concrete which had PET addition range from 0 – 3% in M20 and M30 grade of concrete and tested on 28 day of curing in water. they achieved an average compressive strength of 28.15 MPa and 41.19 MPa respectively for M20 and M30 grades of concrete.

B. *J. M. Irwan, R. Asyraf et.al. (2013):* The Mechanical Properties of PET Fibre Reinforced Concrete from Recycled Bottle Wastes used PET addition of 0.5%,1% & 1.5%. the specimens were tested for 7,14 & 28day curing. they achieve ideal elastic modulus, tensile strength and compressive strength at 0.5% addition of PET.

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C. *D. Maruthachalam, J. Muthukumar (2013):* In study mechanical performance of recycled PET fibre reinforced concrete with low volume fraction. 0.1% to 0.5% for gradation of M40 concrete for duration of 28 days. The got greater results in all properties.

D. *P. Ganesh Prabhu, C. Arun Kumar (2014):* in study on utilization of waste PET bottle Fibre in concrete. 0.5%, 1%, and 1.5% fibre addition. 3 day, 7 day and 28 days for mechanical properties. the ideal result for attained on 1% addition over all platform strength. Baldenebro-Lopez, Castorena-Gonzalez et.al. (2014): After study of paper on Influence of continuous plastic fibres reinforcement arrangement in concrete strengthened. they did addition of spiral shaped of 40mm x 600 mm in fibre volume of 0%,0.25%,0.50% and 1%. they have achieved great strength in overall mechanical properties.

E. *R. Kandasamy, R. Murugesan (2014):* In Study on fibre reinforced concrete using manufactured sand as fine aggregate and domestic waste plastics as fibres. they used 0.5 % fibre addition to concrete specimens for mechanical properties like compressive strength, tensile strength and flexural strength of specimen cured for 7, 14 and 28 days. they achieved great performance results in their research.

F. *Baldenebro-Lopez, Castorena-Gonzalez et.al. (2014):* After study of paper on Influence of continuous plastic fibres reinforcement arrangement in concrete strengthened. they did addition of spiral shaped of 40mm x 600 mm in fibre volume of 0%,0.25%,0.50% and 1%. they have achieved great strength in overall mechanical properties.

G. *Ravikumar, Dr. Ramasamy et.al. (2015):* we studied Effect of Fibers In Concrete Composites. this stated that it there are smart change in strength in conventional concrete. as further environmental benefit by use of fibre as material as its biodegradable waste. fibre used are PET, steel, glass as compare.

H. *Milind V. Mohod (2015):* In study of Performance of Polypropylene Fibre Reinforced Concrete. They studied on Polypropylene Fibre addition of 0% to 2% on concrete specimen for mechanical properties for duration of 7, 14 and 28 days for grade of M30 and M40. the workability of concrete was disappointing and at 1 % it was difficult to compact. the best performance concrete was achieved on 0.5% addition of Polypropylene Fibre.

I. *Showkat Maqbool & Hemant Sood (2016):* After study Effect of PET fibres on the Performance of concrete testing for addition of 2% ,3%,4% and 5% for flexural strength and tensile strength with compare with conventional concrete in there review for grade M20,M25 and M30 at duration of 7 days and 28 days . the specimen used for testing were beam and column of specification 100mm x 100mm x 500mm and 200mm(L) x 100mm (D). they achieve best result on 3% as compared to other addition of 2 %, 4% and 5%.

		M20		M25		M30	
SR NO	PET ADDITION (%)	Flexural strength at 7 days (N/mm2)	Flexural strength at 28 days (N/mm2)	Flexural strength at 7 days (N/mm2)	Flexural strength at 28days (N/mm2)	Flexural strength at 7 days (N/mm2)	Flexural strength at 28days (N/mm2)
1	0	2.6	3.65	2.92	3.96	2.49	2.74
2	2	2.8	3.80	3.04	4.16	3.4	6.0
3	3	3.10	3.96	3.68	4.64	3.8	6.25
4	4	2.92	3.68	3.16	4.32	3.3	4.14
5	5	2.84	3.6	3.0	4.20	3.2	4.12

Table no 1: Results Atained

J. *Vinod L. Patil, Vivek Shukla (2016):* In study of use of fibre as constituent of concrete. it concluded the basics of constituent of concrete gain great shear and bond strength as well as lighter than conventional concrete.

K. *Y. Dinesh, Ch. Hanumantha Rao (2017):* Strength characteristics of fibre reinforced concrete using recycle PET. the paper states that they did replacement in concrete by 0.5%,1% and 1.5% for M25 grade of concrete. duration 3, 7 and 28 days. ideal strength was achieved on 0.5% fibre addition in all type of strength.

L. *Vinod L. Patil, Vivek Shukla (2017):* In study of the use of PET fibre as constituent of concrete we found that they have used PET fibre addition from 0 – 3% the test is conducted on 28 day curing specimens. The test was conducted for workability of concrete the best result was attained at on maximum addition of fibre in concrete of 3% in shear strength get improve by 120.17%. bond strength was improved by 17.33% on 1.5% addition of PET fibre and 25.38% for 3%.

M. *D. Maruthachalam, J. Muthukumar:* In study mechanical performance of recycled PET fibre reinforced concrete with low volume fraction. 0.1% to 0.5% for gradation of M40 concrete for duration of 28 days. The got greater results in all properties.

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III. CONCLUSION

After study of numbers of literature review, we came to conclusion as following:

A. A study says that it is eco-friendly to use Polyethylene Terephthalate (PET) fibre in conventional concrete to improvise the featural mechanical properties in strengths which is beneficial for performance if concrete.
B. Polyethylene Terephthalate (PET) fibre overcome the technical disabilities of conventional concrete which help and change of concrete. this help us to reused plastic waste in profitable way.
C. The maximum ideal result was achieved between 0.3% to 0.75% addition of Polyethylene Terephthalate (PET) fibre.
D. Admixtures improved bonding of fibre and increase in the concrete strength
E. Workability of concrete decrease as dose of addition of Polyethylene Terephthalate (PET) fibre.

REFERENCES

[1] R. N. Nibudey, P. B. Nagarnaik, D. K. Parbat, A. M. Pande "A model for compressive strength of PET fiber reinforced concrete". American Journal of Engineering Research (AJER) 2013 e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-02, Issue-12, pp-367-372
[2] J.M. Irwan, R.M. Asyraf, N. Othman H.B. Koh, M.M.K. Annas and Faisal S.K. "The Mechanical Properties of PET Fiber Reinforced Concrete from Recycled Bottle Wastes". Advanced Materials Research Vol. 795 (2013) pp 347-351 © (2013) Trans Tech Publications, Switzerland doi: 10.4028/www.scientific.net/AMR.795.347
[3] D . Maruthachalam , J. Muthukumar "mechanical performance of recycled PET fibre reinforced concrete with low volume fraction" International Jounal of Structural and Civil Engineering Research ISSN2319-6009 www.ijscer.com vol. 2,no. 2,may 2013 © 2013 IJSCER. All right reserved
[4] P. Ganesh Prabhu, C. Arun Kumar, R pandiyaraj, p. rajesh and sasi kumar "study on utilization of waste PET bottle Fibre in concrete." IMPACT: International Journal of Research in Engineering & Technology (IMPACT: IJRET) ISSN(E): 2321-8843; ISSN(P): 2347-4599 Vol. 2, Issue 5, May 2014, 233-240 © Impact Journals
[5] F.J. Baldenebro-Lopez, J.H. Castorena-Gonzalez, J.I. Velazquez-Dimas, J.E. Ledezma-Sillas, C.D. Gómez-Esparza, R. Martinez-Sanchez, J.M. Herrera-Ramirez "Influence of continuous plastic fibers reinforcement arrangement in concrete strengthened". IOSR Journal of Engineering (IOSRJEN) www.iosrjen.org ISSN (e): 2250-3021, ISSN (p): 2278-8719 Vol. 04, Issue 04 (April. 2014), ||V1|| PP 15-23
[6] R. Kandasamy R. Murugesan "Study on fibre reinforced concrete using manufactured sand as fine aggregate and domestic waste plastics as fibre". Journal of Structural Engineering Vol. 40, no. 6, february - March 2014 pp. 521-531
[7] C. Selin Ravikumar, V. Ramasamy, T.S. Thandavamoorthy "Effect of Fibers In Concrete Composites". International Journal of Applied Engineering Research ISSN 0973-4562 Volume 10, Number 1 (2015) pp. 419-430 © Research India Publications http://www.ripublication.com
[8] Milind V. Mohod (2015) in study of Performance of Polypropylene Fibre Reinforced Concrete." IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X, Volume 12, Issue 1 Ver. I (Jan- Feb. 2015), PP 28-36 www.iosrjournals.org DOI: 10.9790/1684-12112836 www.iosrjournals.org
[9] Showkat Maqbool, Hemant Sood "Effect of PET fibers on the performance of concrete", volume-3, issue 12, December2016
[10] Vinod L. Patil, Vivek Shukla "Use of PET Fibre as Constituent of Concrete" MAT Journals 2016 Journal of Structural Technology Volume1 Issue 3
[11] Y. Dinesh, Ch. Hanumantha Rao **"**strength characteristics of fibre reinforced concrete using recycle PET". International Journal of Civil Engineering and Technology (IJCIET) Volume 8, Issue 4, April 2017, pp.092-099 Article ID : IJCIET_08_04_013ISSN Print: 0976-6308 and ISSN Online: 0976-6316
[12] Vinod L.Patil , Vivek Shukla "Use of PET Fibre as Constituent of Concrete" Vol-3 Issue-2 2017 IJARIIE-ISSN(O)-2395-4396 www.ijariie.com

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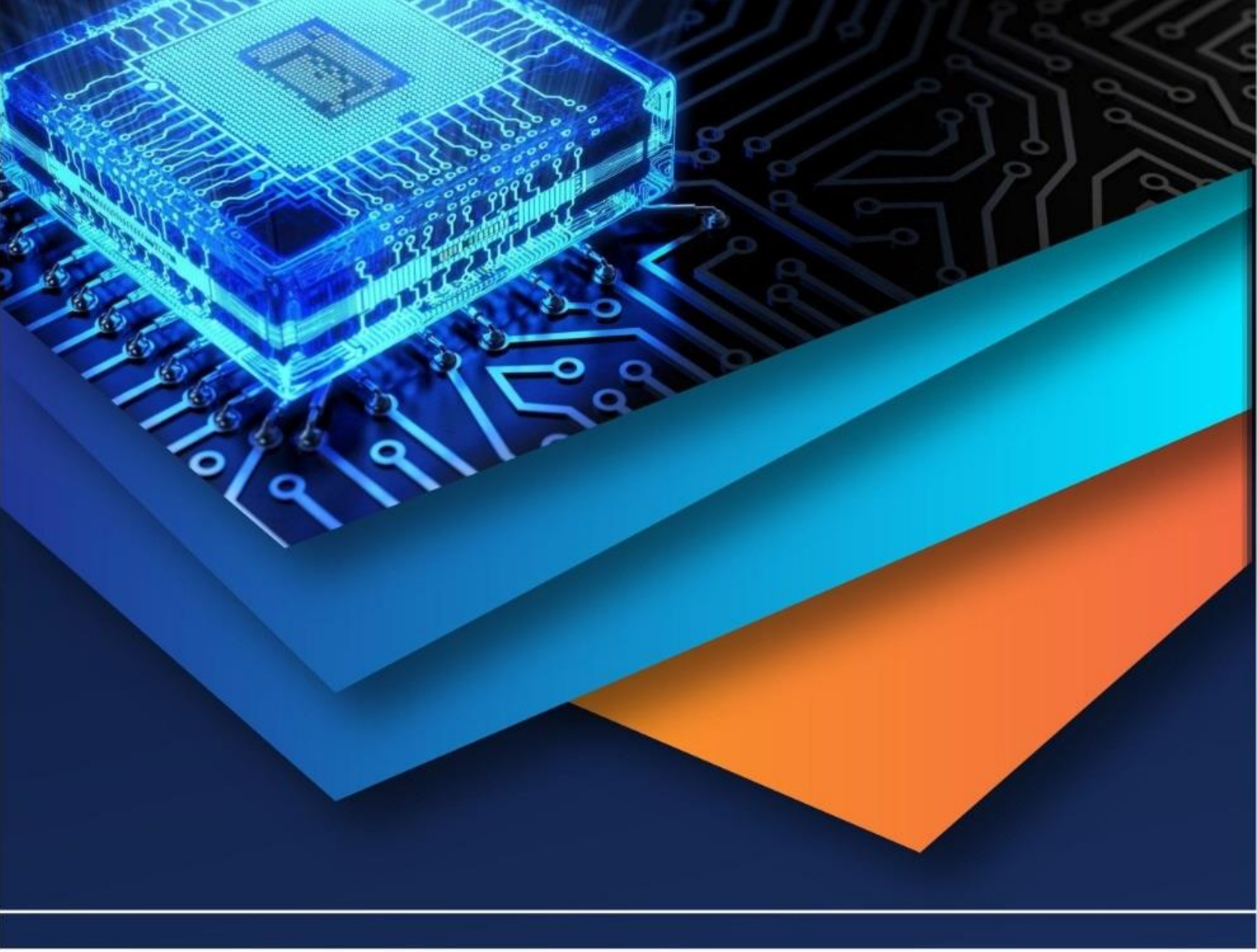

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