International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 6 Issue 4, May-June 2022 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

# Investigation on Properties of Concrete using Waste Plastic Fiber as Partial Replacement of Coarse Aggregate with Fly Ash in Concrete

**Shweta Nagar[1], Prof. Afzal Khan[2]**

[1]M. Tech Scholar, [2]Professor,
[1,2]Department of Civil Engineering, Millennium Institute of Technology, Bhopal, Madhya Pradesh, India

## ABSTRACT

- Investigations were done on M-30grade concrete by replacing coarse aggregate partially by plastic fiber to get maximum strength.
- This project is to use the Waste plastic fibre as reinforcement to concrete and study various strength parameters with the variation in fibre content i.e., to think about the quality properties of solid (M-30 Grade) 10% cement by fly ash with varying percentage of Waste plastic fibre 0%, 0.5%, 1%, and 2 % at 7, 14 and 28 days.

***How to cite this paper:*** Shweta Nagar | Prof. Afzal Khan "Investigation on Properties of Concrete using Waste Plastic Fiber as Partial Replacement of Coarse Aggregate with Fly Ash in Concrete" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-6 | Issue-4, June 2022, pp.665-668, URL: www.ijtsrd.com/papers/ijtsrd50160.pdf

IJTSRD50160



## INTRODUCTION

Concrete is the most widely used construction material. Because of its specialty of being cast in any desirable shape, it has replaced stone and brick masonry. Plain concrete is weak in tension and has limited ductility and little resistance to cracking. Micro cracks are present in concrete because of its poor tensile strength. The cracks propagate with the application of load, leading to brittle fracture of concrete.

Resource management plays the vital role in engineering community because of the increasing population, life style and socio-economic status the inherent use of resources made depletion to the natural sources and provokes us to manage wastes. Plastic is one among such waste which is the parts and package of our life in every one of the perspectives. Thus reuse and reutilize that waste is become fundamental these days.

Concrete is the most broadly utilized development material. Due to its specialty of being projected in any beneficial shape, it has supplanted stone and block workmanship. Plain concrete is powerless in strain and has restricted pliability and little protection from breaking. Miniature breaks are available in concrete in view of its poor elasticity. The cracks propagate with the application of load, leading to brittle fracture of concrete.

### Plastic Fiber Reinforced Concrete

Enhancing the tensile properties of plain concrete numerous strategies have been developed. A considerable lot of the strategies prevailing with regards to making the concrete individuals impervious to strain, however none of them expanded the inborn tractable properties of plain concrete. The scattering of strands in concrete network to enhance its ductile properties has been drilled worldwide more than 3 past decades. The expansion of little firmly separated and consistently scattered filaments to cement would go about as break arrester and would considerably enhance its static and dynamic

properties. This sort of concrete is known as fiber reinforced concrete. Fiber strengthened concrete can be characterized as a composite material comprising of blends of bond, mortar, or concrete and broken, discrete, consistently scattered appropriate strands. Consistent lattices, woven textures and long wires or poles are not thought to be discrete fibers.

**Objectives**

The objectives of the research are outlined below:

- Determination of the compressive strength, split tensile strength, and flexural strength of the concrete with and without waste plastic fibre with 10% cement by fly ash material reinforced concrete.

**Slump Test**

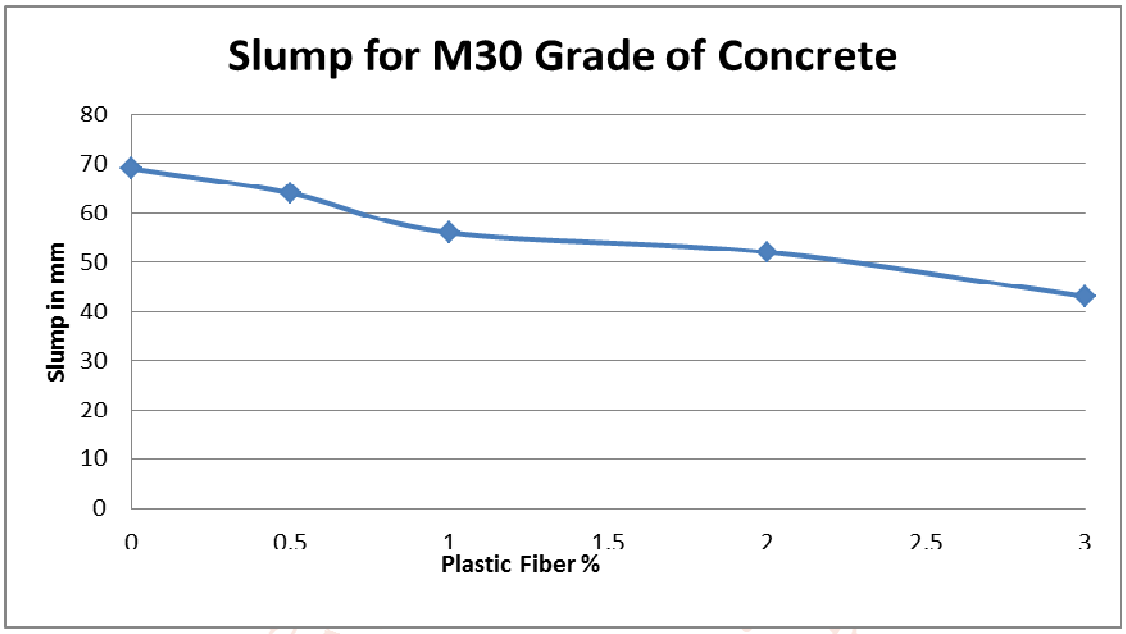


**Figure -5.1 slump value 10% fly ash with varying % of waste plastic fibre**

**Mechanical Strength**

To evaluate the mechanical strength characteristics of concrete reinforced with plastic fibres materials, detailed experimental investigation was carried out and the results are discussed in the forthcoming sections.

**Cube Compressive Strength**

Totally 108 cube specimens of size 150 mm x150 mm x 150 mm with 3 mixes were casted and tested. Three volume fractions were considered for waste plastic fibre (0.5%, 1% and 2% of Plastic fibres ). Results for compressive strength based on the average values of three test data are shown in Figure.

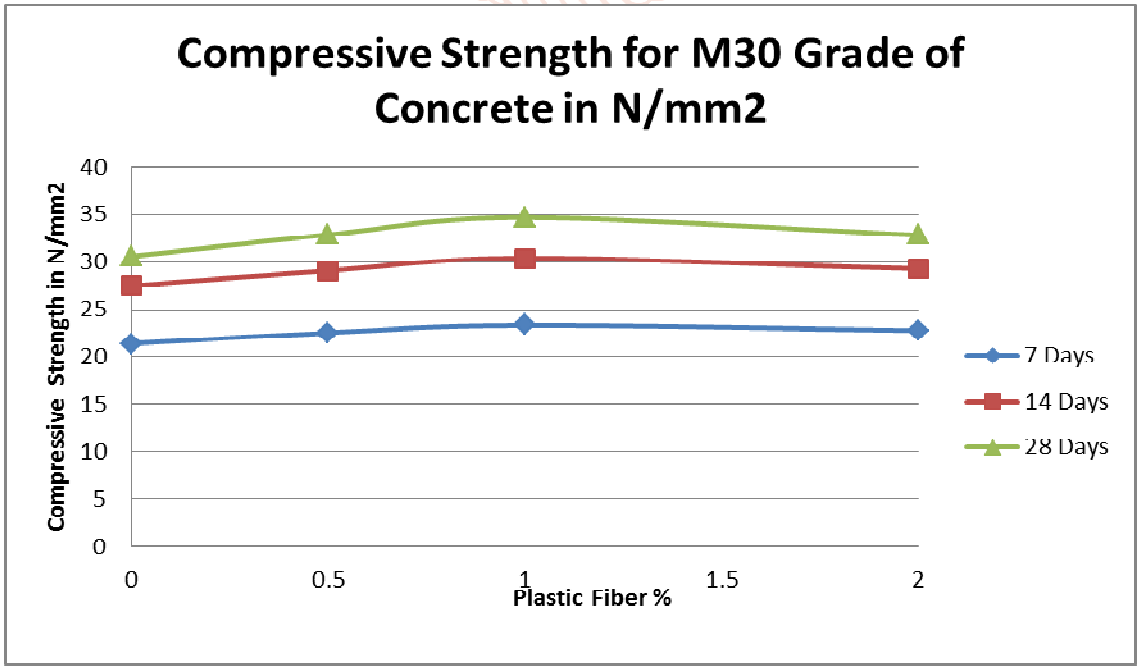


**Figure 1. – Compressive Strength of M30 Grade concrete 10% fly ash with varying % of waste plastic fibre**

**Split Tensile Strength**

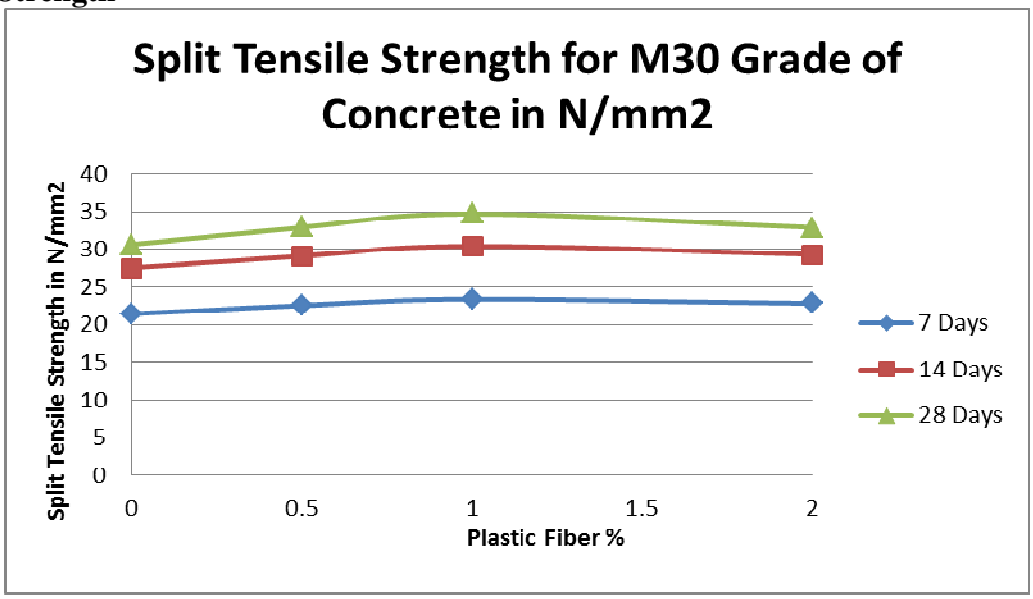


**Figure 2.Split tensile strength of Cylinder 10% fly ash with varying % of waste plastic fibre**

**Discussion:** for M-30 review of cement on chamber example 10% cement by fly ash with varying percentage of Waste plastic fibre 0%, 0.5%, 1%, and 2 % are appeared in table and chart.

**Flexural strength of Concrete:**

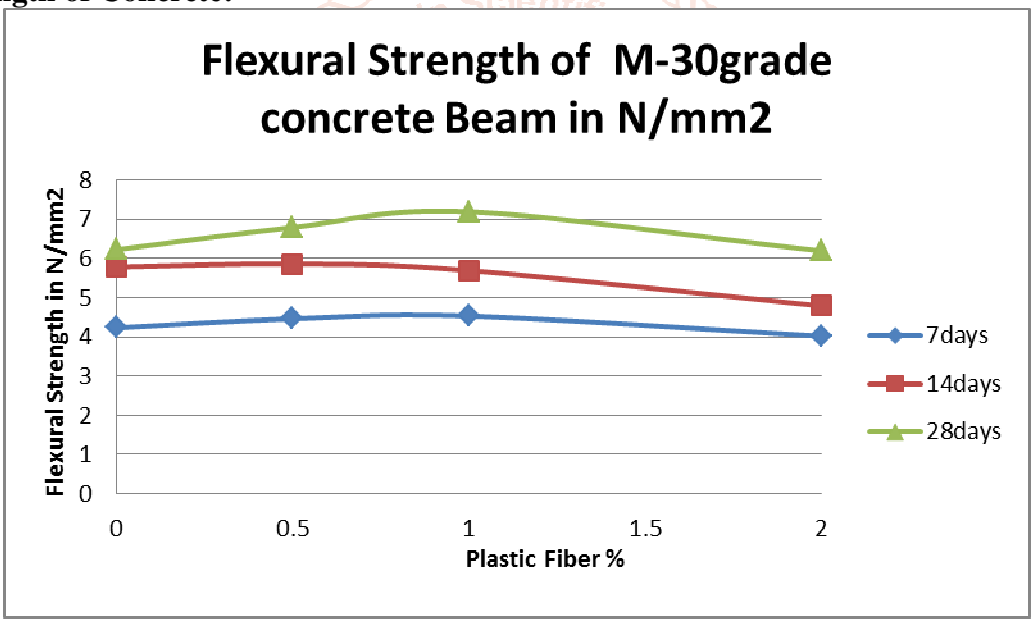


**Figure 3. Flexural Strength of concrete Beam**

**Conclusion-**

Based on the experimental investigation the following conclusion is given within the limitation of the test result.

- It can be concluded that higher strength and workability characteristics of waste plastic fiber reinforced concrete and conventional aggregates can be obtained with 1% addition of fibers into it
- Addition of plastic fiber waste resulted in significant improvement on the quality properties of solid (M-30) grade.

**REFERENCES**

[1] American Society for Testing and Materials, (ASTM). C 192-90a. Standard Method of Making and Curing Concrete Test Specimens in the Laboratory.

[2] Baldenebro-Lopez, F. J., Castorena-Gonzalez, J. H., Velazquez-Dimas, J. I., Ledezma-Sillas, J. E., Gómez-Esparza, C. D., Martinez-Sanchez, R., Herrera-Ramirez, J. M.. "Influence of continuous plastic fibers reinforcement arrangement in concrete strengthened", IOSR Journal of Engineering (IOSRJEN), Vol. 04(04), PP 15-23, 2014.

[3] Ch. Naga, S. K., Krishna, P. V. V. S. S. R. and Rohini, D. K. " Effect of fiber and aggregate size on mode-I fracture parameters of high strength concrete", Advances in Concrete Construction, 5(6), 613-624, 2017.

[4] Foti D. "Preliminary analysis of concrete reinforced with waste bottles PET fibers." Construction and Building Materials. pp. 1906-1915, 2011.

[5] Fraternali et al. "Experimental study of thermo-mechanical properties of recycled PET fiber-reinforced concrete", Composites Structures. pp. 2368-2374, 2011.

[6] Hadj Mostef, A., Merdaci, S., Ouahhabi, H. and Ould Larbi, L. "Concrete with added pozzolana reinforced with metal fibers", Proceedings of the International Symposium: On Composite Materials And Structues, University of Oran, Algeria, November 2011.

[7] Hadj Mostefa, A., Ghernouti, Y., Merdaci, S. and Ouahhabi, H. "Renforcement du béton par desfibres métalliques locaux", Proceedings of the National Symposium: On Local Materials in Construction, University kasdi merbah, Ouargla, Algeria, Novembre 2012.

[8] Hassani, Abolfazl, Hossein Gandjidoust, and Amir Abedin Maghanaki, Use of plastic waste (poly-ethylene terephthalate) in asphalt concrete mixture as aggregate replacement, *Waste Management and Research.*

[9] Hassen, O., and Hadj Mostefa, A. "Influence de la granularité du béton hydraulique sur le ressuage", Nature & Technologie fundamental& et Engineering Sciences, A(8), 23-26, 2013.

[10] Ismail, Z. Zainab, and Enas. A Al-Hashmi, Use of waste plastic in concrete mixture as aggregate replacement, *Waste Management.*

[11] Kim et al. "Material and structural performance evaluation of recycled PET fiber reinforced concrete". Cement & Concrete Composites. pp. 232-240, 2010.

[12] Kshiteesh. G., yotsana, J. "Use of Plastic as Partial Replacement of Fine Aggregate in Fibre Reinforced Concrete". IOSR Journal of Mechanical and Civil Engineering, 71-74, 2017.