

# A REVIEW ON STUDY OF MECHANICAL PROPERTIES OF CONCRETE USING COATED PET FIBERS

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**Abstract** - The demand of concrete increase day by day. Concrete is the second most material after food and water. Now day research on usage of innovative material in concrete to develop it characteristic has been increase plastic waste use in concrete in different stages .the PET(polyethylene terephthalate) Bottles waste use in concrete in fiber. The strength of concrete is decrease when the ratio of PET fibers was increased. PET fiber increase 12% compressive strength added of 0.0 to 3.0% fiber after curing period of 28days.The plastic bottle fibers reduces the quantity of industries fibers used in concrete and plastic bottles fibers is proved to be more economical. This paper includes review of various studies conducted PET fibers used in concrete. The researcher are trying to incorporate one waste product or the other into concrete so that it can help in dual way decreasing the strain on environment and the other effective utilization by enhancement of various mechanical properties of concrete.

**Keywords:** Polyethylene terephthalate (PET) Fiber, compressive strength, tensile strength, flexural strength

## INTRODUCTION

The plastic wastes the most common wastes is POLYETHYLENE TERPHTHALATE (PET) which obtained in large quantity from plastic water bottles used as containers of soft drinks and water. The development of new construction materials using Recycled PET fibers is important to both the construction &PET recycling industries. PET bottles fibers into the concrete it gives with high ductility and high tensile strength but reduce the workability because PET fibers has very weak bond with cement paste .So for using this fibers we need to use a chemical admixture like a super-plasticizer which improve the workability of concrete. The compressive strength of concrete is affected by addition of plastic bottles fibers and it goes on increase addition of 1.5% of plastic in concrete causes about 16% increase in strength after 28 days curing.

## Literature Review

**Showkat Maqbool, HemantSood:** This paper shows study the effect of PET fiber in concrete at different percentage of PET fiber (2to 5%) with M20,M25,M30 grade of concrete. These studies compare the compressive strength of concrete at conventional concrete at different grades of concrete using PET fibers.

The M20,M25,M30 grade for 7,28,56 days of concrete compare with conventional concrete at using PET fiber percentages of 0%,2%,3%,4%,5%.the compressive strength of concrete initially increase by adding the PET fibers from 2% to 3% and the strength of concrete decrease with addition of 4 to 5% PET fibers .the optimum compressive strength of M20,M25,M30 grade of concrete was achieved with the addition of 3% of fibers.

**Aditya Krishna Reddy .k,Arunkumar:** this paper study of mechanical properties of concrete using PET bottles fiber are 0.25%,0.5%,0.75% by replacement of cement by weight. This study use the coated PET bottles fibers with maleic anhydride grafted polypropylene and the fiber in "O" shape, width 5to7mm and diameter of the ring around 10mm and thickness of the fibers is about 0.6mm.in this study super-plasticizer (naphthalene ) replace 0.8% by weight of cement is used. This study compare the compressive strength ,split strength flexural strength on 7<sup>th</sup>,14<sup>th</sup>and28<sup>th</sup> day with percentage 0%,0.25%,0.5%0.75% PET fibers used .in this study the mix proportion for the concrete is made under the guide line of IS 10262-2009 are indicated in Table 1 and the result of tested for compressive strength ,split strength ,flexural strength on 7<sup>th</sup> ,14<sup>th</sup>, 28<sup>th</sup> day show in Table 2 at different percentages of fiber

Table 1 Mix Proportion of concrete

Specimen	UNIT WEIGHT IN KG/m3					
	CEMENT	FA	CA	SP	WATER	W/C RATIO
PET 0%						
PET 0.5%	451	603	1173	3.61	158	0.35
PET 0.75%						

Table 2 Result of Tested specimen for compressive strength ,split tensile strength , Flexural strength on 7<sup>th</sup> ,14<sup>th</sup> and 28<sup>th</sup> day

	COMPRESSIVE STRENGTH IN MPA			SPLIT STRENGTH IN MPa			FLEXURAL STRENGTH IN MPa		
	7	14	28	7	14	28	7	14	28
	DAYS	DAYS	DAYS	DAYS	DAYS	DAYS	DAYS	DAYS	DAYS
PET 0%	39.11	47.9	55.29	2.7	3.32	4.13	3.17	3.83	5.67
PET 0.25%	40.31	49.5	56.49	2.87	3.54	4.34	3.33	4.17	6.33
PET 0.5%	41.79	50.5	58.22	3.01	3.81	4.72	3.83	4.5	6.57
PET 0.75%	42.59	51.75	59.01	3.14	4.01	5	4.33	5.33	7.67

These tables show that the compressive strength ,split tensile strength ,Flexural strength increase with increase in the curing time .the use of super plasticizer (naphthalene) is improve the workability of concrete dosage of 0.8%.

**Ms. K. Ramadevi ,MsR.Manju :** this paper studies the mechanical properties of concrete replace the fine aggregates with PET fibers at 1%,2%,3%,4% and 6% for M25 grade concrete .the replacement present is by volume of total aggregates content derived from the mixture proportioned . OPC 53grade of cement and plastic bottles fibers is used . this paper compare the compressive strength ,split tensile strength ,flexural strength at different percentage of PET bottles fibers 1%,2%,3%,4%,5% and 6% and the strength is increased in 2% replacement of the fine aggregates with PET bottles fibers and gradually decreased for with 4%and 6% replacements.

**SalahaldeinAlsadey :**This paper studies of plastic bottles fiber in concrete added 0.0 %and 3.0% fiber with M25 grade. The compressive strength and workability be measured in this studies .the workability is measure from a flow and slump test .the ordinary Portland cement, sea sand, crushed coarse aggregates,water and plastic bottles fibers are used .the workability are compare between flow test and slum test with added of plastic fiber at percentage of 1.5%,2%,2.5%and 3%.the addition of fiber the value of flow test is decrease the workability. In Table 3 are the result is given, and the 28 days compressive strength results were presented in Table 3.1 the compressive strength of concrete goes on increasing with increasing of percentage of the concrete plastic bottles fiber but the rate of increase of plastic fibers the strength is decrease and maximum increase in strength is 1.5% added of PET fibers and reduction in strength in 4%to 5% of fiber .

Table 3 Results Obtained from slum and Flow Test

Mixture	Plastic bottles fibers content%	Slump mm	Flow mm
M0	0	130	505
M1	1	75	460
M2	1.5	65	440
M3	2	60	390
M4	2.5	50	325
M5	3	45	310

Table 4 compressive strength of concrete prediction from bottle fiber after 28 days

Mixture	Fiber content%	Compressive strength (N/mm <sup>2</sup> )
M0	0	25
M1	1.0	28
M2	1.5	29
M3	2.0	27
M4	2.5	27
M5	3.0	25

These above table represents that the use plastic bottles fiber can be possible to increase the strength of concrete and the super-plasticizer is necessary for higher grade to get required slump &workable mix.

### CONCLUSIONS:

The pervious paper mainly focuses on strength properties of concrete by addition of PET bottles fibers with different dosages. The optimality and effect of PET bottles fibers on concrete properties are studied and behavior of concrete is experimentally verified by casting cubes, cylinders and beams specimen.

Studies have shown that the addition of PET bottles fibers in a concrete matrix in prove the mechanical properties of concrete , especially compressive strength ,split tensile strength ,flexural strength.

The following are the conclusion obtained from the present study

The mechanical properties of concrete such as compressive strength ,split tensile strength, flexural strength etc. are greatly influenced by addition of PET fiber, optimum dosage of PET fibers governs these properties and must carry out optimality study on PET Fibers. The PET fibers use in concrete is reduce the weight of concrete and thus mortar with PET fibers can be made into the light weight concrete based on unit weight .

1. The different percentages of PET fibers concrete were compared with the conventional concrete in term of compressive strength of grade M20,M25,M30 for 7,14,56 days ,and it was observed that the compressive strength of concrete initially increased by adding PET fibers from 2% to 3% and decrease the addition of 4% to 5%.the maximum compressive strength is achieved with addition of 3% Pet fibers . The PET fibers are replacement with fine aggregates.

2. It was observed that the split tensile strength and flexural strength increased up to 2% replacement of the fine aggregates with the PET plastic bottles fibers and decreased for 4% to6%.the maximum strength of concrete is gain in 3% of addition of PET Fibers and minimum strength of concrete is gain in 6%.

3. The uses of admixture improves bonding of fibers and increase the strength of concrete.

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