



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 8, August 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Use of Polyester Recron Fibre to Improve Compressive and Flexural Strength of Concrete

Mr. Sanket Divate¹, Prof. Dr. Satish Patil², Prof. Aniket Patil³

¹PG Student, Department of Civil Engineering, MIT – ADT School of Engineering, Pune, Maharashtra, India

²Hod & Prof., MIT – ADT School of Engineering, Pune, Maharashtra, India

³Asst. Professor, MIT – ADT School of Engineering, Pune, Maharashtra, India

ABSTRACT: The influence of Polyester Recron Fibre was studied in the different proportioning, 18mm length fibre is used. The main objective of this research is to improve compressive and flexural strength of concrete by addition of Polyester Recron Fibre to conventional concrete. Thus hardened properties of concrete such as compressive strength & flexural strength are evaluated. Also, workability (slump test) for Polyester Recron Fibre concrete is conducted simultaneously. Fibre addition is to enhance the physical and mechanical properties of concrete. Workability decreases with increasing the dosage of Polyester Recron Fibre. Compressive strength increases up to 20-25 percent at 28 days similarly flexural strength also increases by 20 percent at 28 days curing up to dosage of 3 percent. In this research the addition of Polyester Recron Fibre with percentage varying from 1.5%, 2%, 2.5%, 3.0%, 4.0% & 5.0% is studied. The scope of work is limited to improve compressive and flexural strength of concrete.

KEYWORDS: Polyester Recron Fibre , Compressive Strength , Flexural Strength, Concrete , Aggregate

I. INTRODUCTION

Concrete is an extraordinary and key structural material in human history. Concrete holds the credit of being the most widely utilized tailored or man-made material in the construction industry and will hold good for many years. The credit goes to the properties of concrete like excellent strength, durability, less maintenance costs and use in many structural applications.

Concrete being the most versatile material has become a choice for a variety of structural applications like houses, industrial structures, highways, bridges and water retaining structures. This is mainly due to the easy availability of the ingredients of concrete.

Concrete is one of the most important materials among the building materials in all types of civil engineering works. Since the adaptation of concrete as a building material, lot of researches and studies has been made to improve the quality, strength and durability of it. By the same time efforts are also being made to economize concrete construction compared to other materials. Plain concrete is good in compression but weak in tensile strength with very limited ductility and little resistance to cracking. Internal micro cracks are inherently present in concrete and its poor tensile strength is due to propagation of such micro cracks, eventually leading to brittle fracture of concrete. To reduce the cracks and impart improvements in tensile property of concrete members using conventionally reinforced steel bars and also by applying restraining techniques. Although both these methods provide tensile strength to concrete members, they however do not increase the tensile strength of concrete itself.

It has been recognized that the addition of small closely spaced and uniformly dispersed fibres to concrete would act as crack resistance and substantially improve its static and dynamic properties. This type of concrete is known as FIBER REINFORCED CONCRETE. In these dissertations an attempt will be made to view the behaviour of concrete mixed with POLYESTER RECRO 3s FIBRE in comparison with plain concrete

The best mineral admixtures in optimum proportions mixed with OPC improves many qualities of concrete such as lowers the heat of hydration, increases the water tightness, reduces alkali-aggregate reaction, improves workability and resistance from attack by sulphate soils, sea water etc.



2.Experimental Program

Table.1. Properties of Recron Fibre

Sr. NO.	Properties	Recron 3S	Advantages
1	Material.	100% Virgin Synthetic Fibre.	Conform to: Type III under ASTM C 1116
2	Cut Length.	3/4.8/6/ 12 18 / 24	Multiple length provides choice of aspect ratio.
3	Cross Section.	Triangular.	Recron 3S offers 40% more surface area than corresponding circular.
4	Specific Gravity.	Polypropylene - 0.96 Polyester-1.36	Offer homogeneous concrete mix.
5	Melting Point.	Polypropylene@160° Polyester@240°	Usage as per need.
6	Dispersion.	Excellent	Excellent dispersion in mixers.
7	Young's Modulus.	> 5000	> 4000
8	Alkaline-Stability.	Very Good.	Conform to test procedure laid by ICBO AC 32.

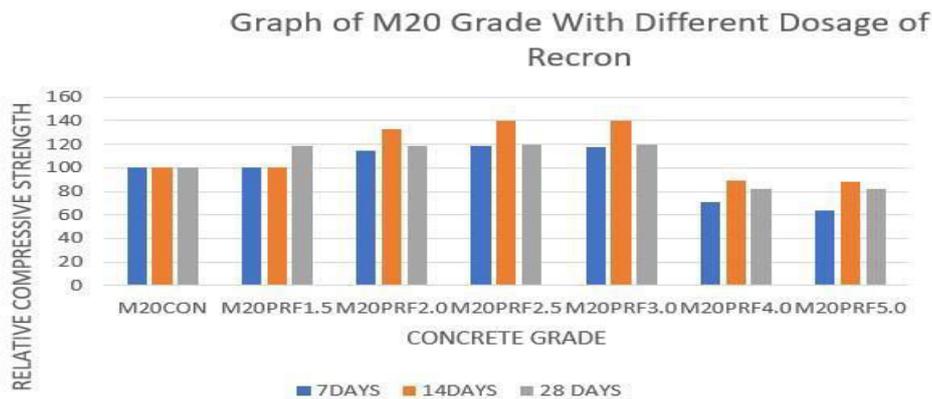
Table.2. Mix Proportion of concrete (per cum.)

Sr. No	Water Content (kg/m ³)	Cement (kg/m ³)	Polyester Recron Fibre (kg/m ³)	Coarse Aggregate (kg/m ³)	Fine Aggregate (kg/m ³)
M20	197	397	6 to 20	1267.64	700
M25	197	437.77	6.7 to 22	1078	662
M30	157.6	400	6 to 20	1085	658



III. RESULT AND DISCUSSION

Compressive Strength of Polyester Recron Fibre-



v Figure No.1. Graph of Compressive Strength of M20 Grade With Different Dosage of Polyester Recron Fibre

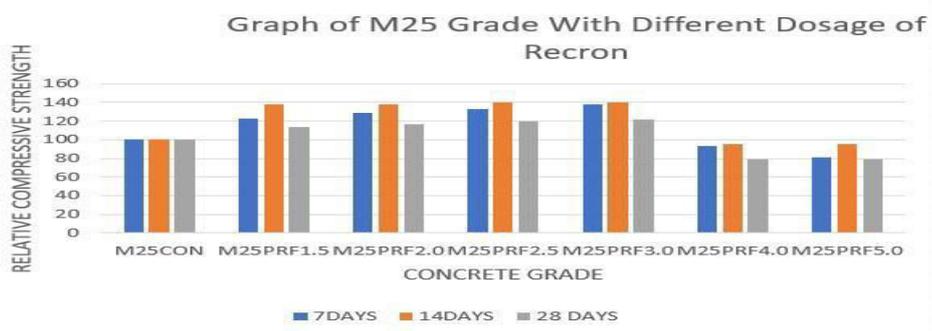


Figure No.2. Graph of Compressive Strength of M25 Grade With Different Dosage of Polyester Recron Fibre

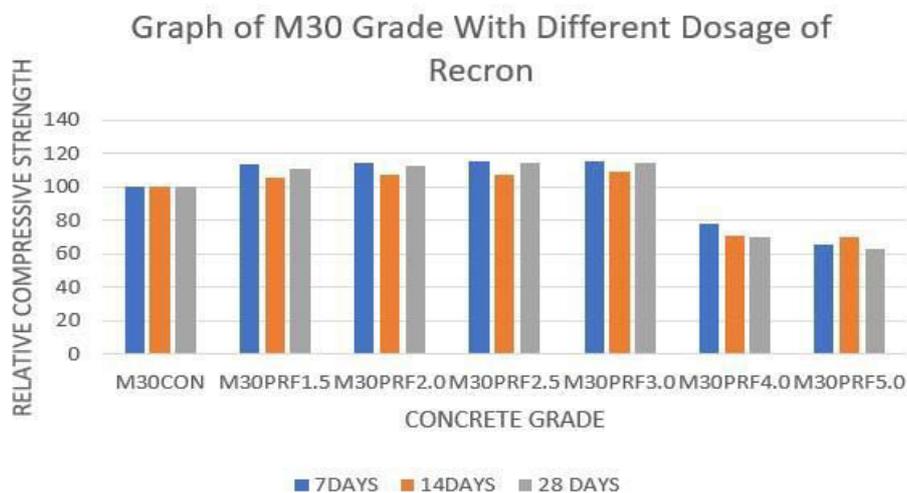


Figure No.3. Graph of Compressive Strength of M30 Grade With Different Dosage of Polyester Recron Fibre



Based on above Figure.1,2 & 3 when Polyester Recron Fibre dosage is minimum strength goes on increasing as compared to conventional concrete. But after some extent of dosage i.e.after 3% of dosage compressive strength goes on decreasing. It can be said that only up to 3% addition of Recron fibre by weight of cement should be done. Addition of Polyester Recron fibre above 3%, compressive strength decline.

Flexural Strength of Polyester Recron Fibre —

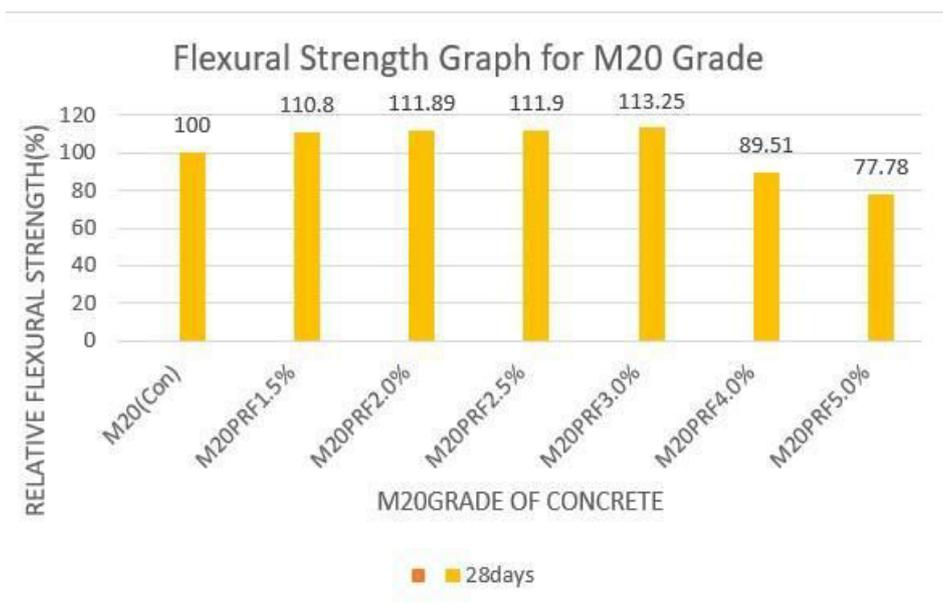


Figure No.4. Graph of Flexural Strength of M20 Grade With Different Dosage of Polyester Recron Fibre

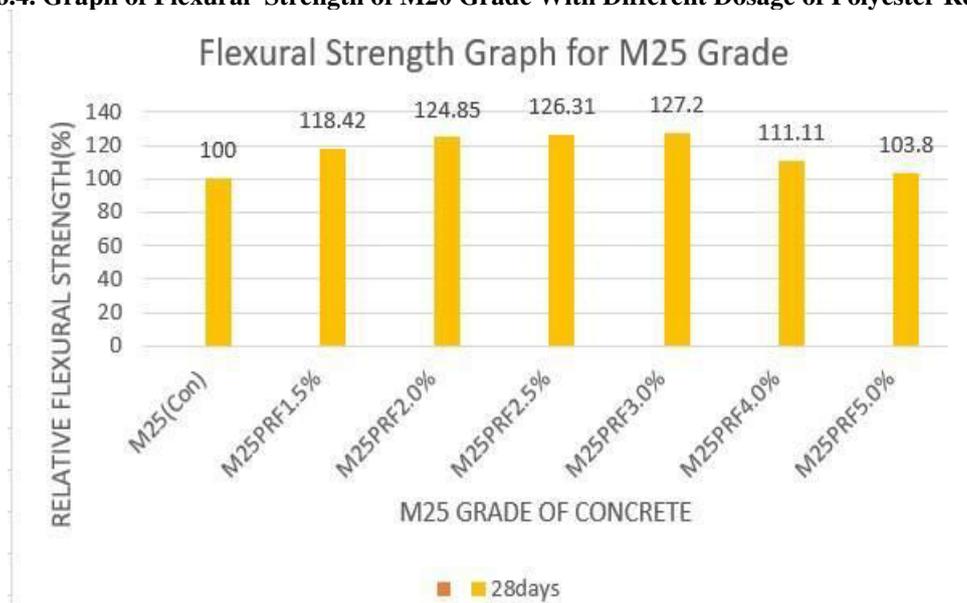


Figure No.5. Graph of Flexural Strength of M25 Grade With Different Dosage of Polyester Recron Fibre



Figure No.6. Graph of Flexural Strength of M30 Grade With Different Dosage of Polyester Recron Fibre

Flexural strength or bending strength is mechanical parameter of material, which is defined as material ability to resist deformation under load.

In above figure.4, 5 & 6 flexural strength for different grade is mentioned with Polyester Recron Fibre.

From above graph, it is seen that flexural strength goes on increasing with addition of Recron fibre up to 3% percent of dosage.

The strength achieved up to 3% is more as compared to conventional concrete. But increasing dosage above 3% is not advisable because flexural strength decreases suddenly after 3%.

IV. CONCLUSION

Based on the observed results and detailed analysis, following conclusions are drawn from the research investigation. –

- The workability of Polyester Recron Fibre concrete reduces with the increased dosage of Recron percent by weight of cement since fibre is light in weight its quantity with respect to cement increases.
- 20-25 % increase in compressive strength is observed with addition of Recron fibre.
- The dosage for the required compressive strength of concrete is increased only up to 3% Polyester Recron Fibre with cement mix. Above 3% the compressive strength of concrete decreases considerably.
- 25 percent increase in flexural strength of Polyester Recron Fibre Concrete is observed as compared to conventional concrete.
- Above 3% percent addition of Polyester Recron Fibre flexural strength of beam decreases. Because Recron content in volume becomes more as compare to cement.

REFERENCES

1. **Ahmed Godat, Yasmin obaidat**, “Nonlinear finite element investigation of parameter affecting externally bonded FRP RCC beams” United Arab Emirates University, Volume 8 ,Elsevier, December 2018.
2. **Debora Martinello Carlesso**, “Fatigue of plastic fibre reinforced concrete in bending assessment and prediction”, Volume 115, Springer link, January 2021.
3. **Elavarasi. D, M Sarvana Raja** “ Structural Behaviour of High Strength Steel Fibre Reinforced Concrete” International Journal of Chem Tech Research , January 2015.
4. **Felipe Alves Amancio, Maria Fabiola de Carvalho Rafael**, “Behaviour of Concrete Reinforced with Polypropylene Fibre Exposed to High Temperature” XIV International Conference on Building Pathology and Repair, Structural IntegrityII, Elsevier 2018.



5. **Gauri Mohan, Nazeer M** “An Experimental Study on Hybrid Fibre Reinforced Concrete” Volume 7, International Journal of Earth and Science Engineering, June 2014.
6. **Gerbert P .Moreira neto, Philip deO. Vital**, “Influence of specimen size for impact testing of fibre reinforced cementitious composite by Charpy test” FRC improvement and innovation II, Conference Paper, January 2022
7. **G Jenitha, K Alagusanakareswari** “Experimental Study on Behaviour of Fibre Reinforced Concrete”, Volume 7, International Journal of Scientific and Engineering research, December 2016.
8. **Korrapati Anil Kumar** “Experimental Investigation on Concrete Using Recron Fibre as Reinforcement”, Volume 4, Issue 3, International Journal of Applied Engineering, October 2017.
9. **Matheus.G. Cardoso, Rodrigo M Lameriras**, “Mix proportioning of fibre reinforced self compacting. Concrete adopting compressible packing method”, Volume 36, Springer link, 2017.
10. **Maure De Smedt, Lucie Vandewalle**, “Uniaxial tension test of steel fibre reinforced concrete”, Conference Paper, Volume 36, Springer link, September 2018.
11. **Muhammad Nawazish Hussain** “Application of Recron 3S Fibre in Improving Silty Subgrade Behaviour” Volume 12, International Journal of Mechanical and Civil Engineer, April 2015.
12. **S Satish Kumar** “Experimental Investigation of Concrete Using Recron Fibre”, Volume 8, International Journal of Innovative Research in Science and Technology, May 2019.
13. **Vaibhav Shirodkar** “Experimental study on 3S fibre” Volume 4, International Journal of Mechanical and Civil Engineering, 2021.
14. **Vikrant Patel** “Performance Evaluation of Polymer Fiber “RECRON-3S” in Pavement Quality Concrete, Volume 2, Issue 11, International Journal for Scientific Research and Development, 2015.



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details