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REVIEW ON EXPERIMENTAL STUDY OF POLYPROPYLENE CONCRETE FIBRE WITH ADMIXTURE

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ABSTRACT

Concrete made with Portland cement has certain characteristics: it is relatively strong in• compression but weak in tension and tends to be brittle. These two weaknesses have limited its use. Another fundamental weakness of concrete is that cracks start to form as soon as concrete is placed and before it has properly hardened. These cracks are major cause of weakness in concrete particularly in large onsite applications leading to subsequent fracture and failure and general lack of durability. The weakness in tension can be overcome by the use of conventional rod reinforcement and to some extent by the inclusion of a sufficient volume of certain fibers. Polypropylene is a synthetic hydrocarbon polymer, the fiber of which is made using extrusion processes by hot drawing the material through a die. This paper deals with the effects of addition of various proportions of polypropylene fiber on the properties of concrete. In this paper various literature are studied and conclusion has been made regarding use of polypropylene fibre in concrete.

Keywords*: Polypropylene fibers, Mix proportions, Compressive strength, Splitting strength, Flexural strength*

1. INTRODUCTION

Polypropylene Fiber Reinforced Concrete (PFRC) is an embryonic creation material which may be defined as a concrete having excessive mechanical strength, stiffness and durability. By usage of polypropylene fibers in concrete now no longer simplest optimal usage of materials is completed however additionally the cost reduction is completed. Concrete has higher resistance in compression even as metal has extra resistance in tension. Conventional concrete has constrained ductility, low effect and abrasion resistance and little resistance to cracking. A suitable concrete ought to own excessive strength and occasional permeability. Hence, opportunity composite materials are gaining recognition due to ductility and pressure hardening. To enhance the put up cracking behavior, quick discontinuous and discrete fibers are delivered to the apparent concrete. Addition of fibers improves the put up height ductility overall performance, pre-crack tensile strength, fracture strength, toughness, effect resistance, flexural strength resistance, fatigue overall performance etc. The ductility of fibre reinforced concrete relies upon at the capacity of the fibers to bridge cracks at excessive stages of pressure. Addition of polypropylene fibers decreases the unit weight of concrete and will increase its strength .

By usage of polypropylene fibers in concrete now no longer simplest optimal usage of materials is completed however additionally the cost reduction is completed. This paper offers a complete overview on diverse components polypropylene fiber reinforced concrete regarding the behavior, packages and overall performance of polypropylene fiber reinforced concrete.

2. LITERATURE REVIEW

Over the years, with a view to growth concrete's flexural strength, ductility and strength absorption many researches have been made and ongoing. As a end result of beyond studies FRC has been brought which ended in multiplied tensile strength, fatigue strength, and effect strength.

M Yeswanth, et.al, (2016), This paper states that, An experimental study has been performed to research the impact of polypropylene fibre on concrete with addition of fibres and fly ash. In this have a look at 9 distinctive extent fractions (0%, 0.05% ,0.1%, 0.15%, 0.2%, 0.25%, 0.30%, 0.35%, 0.40%) have been used. From the simple check performed we come recognize that addition of polypropylene fibre has a touch damaging impact at the workability of concrete containing fly ash. With the growth in fibre extent, each the hunch fee and hunch flow are reducing regularly. However, the addition of polypropylene fibre and fly ash has substantially stepped forward the strength in hardened concrete tests. Moreover, there's a bent of growth in cracking resistance while in comparison to different concrete composites with out fibre and fly ash. There have additionally been numerous advances made withinside the improvement of fibre reinforced concrete to manipulate cracking and crack propagation in undeniable concrete, and to growth the general ductility of the material. However, there at the moment are many forms of fibres with distinctive materials and geometric propertys, however the specific fracture behaviour of fibre reinforced concrete materials isn't always absolutely understood. Majorly, artificial fibre has performed a dominant function for a long term in a number of programs for his or her excessive unique strength and modulus.

Abhishek Nayak, et.al (2018), This paper describes a have a look at of conduct of polypropylene fibre reinforced concrete withinside the current production industry. The have a look at of the infuence of addition of polypropylene fibres at growing dosage from 0.5% to 2.5% of overall weight of cement become achieved. Its use in concrete makes efiective usage of tensile and flexural strength of the material along side reduction of plastic shrinkage cracking and thermal cracking. Experiment become executed the usage of M-30 mix and Compression check; Split Tensile check and Flexural Strength check have been achieved at 7 and 28 days as in keeping with standard tactics via way of means of applicable codes. The end result become in comparison with traditional concrete and it become located that concrete with 1.5% via way of means of weight of polypropylene fibre as additive, confirmed maximum strength of concrete with reduced self weight. The strength reduced regularly with similarly growth in percent of polypropylene fibre.

Julia Blazy, et. al, (2021) , Fiber reinforced concrete is a cementitious composite material with a dispersed reinforcement in a shape of fibers. Polypropylene fibers may be divided into microfibers and macrofibers relying on their period and the characteristic that they carry out withinside the concrete. An assessment of decided on polypropylene fibers to be had available in the marketplace become presented. Moreover, the impact of polypropylene fibers on bodily and mechanical propertys of concrete together with workability; elasticity modulus; compressive, flexural, and tensile strength; toughness; effect, spalling, freeze-thaw, abrasion resistance; water absorption; porosity; permeability; durability, and green and economical propertys have been discussed. Additionally, positive regulations even as designing fiber reinforced concrete combination have been mentioned. The article proved that public areas are a promising subject of polypropylene fiber reinforced concrete application. Since they're subjected to e.g. unfavourable environmental conditions, effect damages, floor abrasion, and vandalism, the usage of concrete with more desirable propertied may be undeniably beneficial.

Ms. Komal Bedi, (2014), The predominant motive of this paper is to have a look at the results of polypropylene fiber at the flexure strength of concrete. The experimental programmed become under taken to check standard concrete beam of size (one hundred fifty X one hundred fifty)mm with a span seven hundred mm for reading strength in flexure. The pattern have been in comparison with none fiber and with polypropylenes fiber of depth 0.89 kg in keeping with cum of concrete. To offer a foundation for flexure, reference specimens have been forged without polypropylene fiber. The check effects confirmed that the mechanical propertys of flexural strength as a result of brought of polypropylene fiber become especially excessive.

Shaik Abdul Irfan Khan, et.al(2017), The paper states that, Self–compacting concrete (SCC) is the concrete this is capable of flow under this is capable of flow withinside the indoors of the formwork, filling it in a herbal way and passing via the reinforcing bars and different obstacles, flowing and consolidating under the motion of its very own weight. These propertys permit the SCC to be an top notch material for structures with complex shapes and congested reinforcement. One of the principle benefits in the usage of SCC is the minimization of professional labour wished for putting and completing the concrete. All those blessings lower the charges and decrease the time of the constructing method over structures crafted from historically vibrated concrete. However, hardened self-compacting concrete continues to be as brittle as everyday concrete and has a terrible resistance to crack growth.To enhance the post-top parameters of SCC, polypropylene (Recron fibres) are brought. As self-compacting concrete gives numerous economical and technical benfits the usage of polypropylene, polyester and glass fibres extends its possibilities. Polypropylene fibres bridge cracks, retard their propagation, and enhance numerous traits and propertys of the SCC. The motive of thesis is to research the results of weight fraction of polypropylene at the compressive strength, break up tensile strength, and modulus of elasticity of polypropylene fibre reinforced self-compacting concrete. For this motive, Recron fibres have been used. 4 distinctive fiber volumes have been brought to concrete mixes at 0.1, 0.2, 0.3and 0.4 percentage via way of means of weight of cement. 4 distinctive mixes have been organized. After 28 days of curing, compressive strength, break up tensile strength and modulus of elasticity have been decided. It become located that, inclusion of polypropylene fibres extensively have an effect on the compressive strength, break up tensile strength and modulus of elasticity of self-compacting concrete.

Nidhi Sharma, (2017)6, on this gift paintings experimental research has been executed to study the alternate in conduct of High Strength Concrete (HSC) the usage of PPF. In this paper, contrast of traditional concrete of grade M60 has been executed with High Strength Concrete containing 3%, 4% & 5% of Polypropylene fibers changing the cement content material. Sikament, the superplasticizer 0.5% via way of means of weight of cement has been brought to the concrete. The experimentation ended in stepped forward growth in compressive strength, break up tensile strength and flexural strength. It has been located that compressive strength will increase via way of means of 5.35%, 6.2% & 7.9% at 3%, 4% and 5% respectively. It has been located that break up tensile strength will increase via way of means of 18.08%, 24.3% & 37.3% at 3%, 4% and 5% respectively. It has been located that flexural strength will increase via way of means of 14.4%, 21.2% & 31.4% at 3%, 4% and 5% respectively. High Strength Concrete with 5% of Polypropylene Fiber content material changing the cement confirmed the top-rated effects.

Naidugari M K Rao, et.al, (2017), In this experimental have a look at entails forms of concrete mixes have been organized in my opinion. Polypropylene fiber of 1% to 3% with Quarry dirt of 0.1% to 0.3% and Polypropylene fiber of 1% to 4% with Fly ash of 0.1% to 0.4% via way of means of weight of cement have been brought to the mixes. After that a comparative evaluation has been achieved for traditional concrete to that of the fiber reinforced in terms of their compressive, break up tensile and flexural propertys. By the experimental paintings the compressive, break up tensile and flexural strengths are proportionally multiplied each Polypropylene + Quarry dirt and Polypropylene +Fly ash usage. It is located that the top-rated dosages of Polypropylene + Quarry dirt is 3% + 0.3% Polypropylene +Fly ash is 4%+ 0.4% via way of means of weight of cement. In this challenge fee evaluation is likewise decided for traditional concrete and fiber reinforced with admixtures in my opinion the usage of experimental check reports.

3. CONCLUSION

From above Literature survey, we have studied that there is no any precise code for designing of Polypropylene Fibre Concrete. So we are going to do the experimental model on trial and error basis and comparing the same with conventional model.

The use of polypropylene fibers has increased in recent years due to the property of the fibers to eliminate some defects in concrete. The results of the projects show that there is only comparable difference in properties compared to normal Concrete which concludes that Polypropylene fibre Concrete

can be implemented using the Indian Standard code (IS 456:2000). Analysis was performed on the Polypropylene fibre Concrete and the results have concluded that Polypropylene fibre Concrete have the same load carrying capacity compared to that of conventional Concrete in load which is specified in IS(456:2000)

The density of concrete decreases with fibre addition compared to normal concrete specimen. Hence, when it is used in construction, it can reduce the self weight of different concrete elements in a building considerably, thus reducing the total dead load on the footing. Further, it is observed that the concrete with polypropylene fibre has higher yield point than normal concrete. It does not fail suddenly as in the case of flexural testing on beam with normal concrete due to its brittle nature; instead, fibre added concrete behaves like a ductile member and then undergoes failure after yield point. This study indicates that the mechanical properties of concrete are enhanced by addition of the polypropylene fibre as an additive.

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