A

Seminar report

On

Fiber Reinforced Concrete

Submitted in partial fulfillment of the requirement for the award of degree
Of Civil

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Preface

I have made this report file on the topic, **Fiber Reinforced Concrete;** I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to ……..who assisting me throughout the prepration of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

Acknowledgement

I would like to thank respected Mr…….. and Mr. ……..for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a seminar report. It helped me a lot to realize of what we study for.

Secondly, I would like to thank my parents who patiently helped me as i went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs.

Thirdly, I would like to thank my friends who helped me to make my work more organized and well-stacked till the end.

Next, I would thank Microsoft for developing such a wonderful tool like MS Word. It helped my work a lot to remain error-free.

Last but clearly not the least, I would thank The Almighty for giving me strength to complete my report on time.

Content

INTRODUCTION

Fiber-reinforced concrete (FRC) is concrete containing fibrous material which increases its structural integrity. It contains short discrete fibers that are uniformly distributed and randomly oriented. Fibers include steel fibers, glass fibers, synthetic fibers and natural fibers – each of which lend varying properties to the concrete. In addition, the character of fiber-reinforced concrete changes with varying concretes, fiber materials, geometries, distribution, orientation, and densities.

What is fiber reinforced concrete?

Fiber reinforced concrete (FRC) is a new structural material which is gaining increasing importance. Addition of fiber reinforcement in discrete form improves many engineering properties of concrete.

History of Reinforced Concrete

Fibers have been used for concrete reinforcement since prehistoric times though technology has improved significantly, as is applicable for other fields.

In the early age, straw and mortar were used for producing mud bricks, and horsehair was used for their reinforcement. As the fiber technology developed, cement was reinforced by asbestos fibers in the early twentieth century.

During the middle of the twentieth century, extensive research was in progress for the use of composite materials for concrete reinforcement. Later, the use of asbestos for concrete reinforcement was discouraged due to the detection of health risks.

New materials like steel, glass, and synthetic fibers replaced asbestos for reinforcement. Active research is still in progress on this important technology. Fiber Reinforced Concrete is considered to be one of the greatest advancements in the construction engineering during the twentieth century.

APPICATION OF FRC

It is used on account of the advantages of increased static and dynamic tensile strength and better fatigue strength.

It has been tried on overlays of air-field, road pavements, industrial footings, bridge decks, canal lining, explosive resistant structures, refractory linings,etc.
Used for the fabrication of precast products like pipes, boats, beams, stair case steps, wall panels, roof panels, manhole covers etc.

It is also being tried for the manufacture of prefabricated formwork moulds of "U" shape for casting lintels and small beams.

Fiber reinforced concrete is used for:

- Industrial flooring
- Sprayed concrete
- Slender structures (usually in precast plants)
- Fire resistant structures
- mortar applications (rehabilitation)

Types of Fiber-Reinforced Concrete

Steel Fiber-Reinforced Concrete

- Steel fiber-reinforced concrete is basically a cheaper and easier to use form of rebar reinforced concrete. Rebar reinforced concrete uses steel bars that are laid within the liquid cement, which requires a great deal of prep work but make for a much stronger concrete.

  Steel fiber-reinforced concrete uses thin steel wires mixed in with the cement. This imparts the concrete with greater structural strength, reduces cracking and helps protect against extreme cold. Steel fiber is often used in conjunction with rebar or one of the other fiber types.

Glass Fiber Reinforced Concrete

- Glass fiber-reinforced concrete uses fiberglass, much like you would find in fiberglass insulation, to reinforce the concrete. The glass fiber helps insulate the concrete in addition to making it stronger. Glass fiber also helps prevent the concrete from cracking over time due to mechanical or thermal stress. In addition, the glass fiber does not interfere with radio signals like the steel fiber reinforcement does.

Synthetic Fibers

- Synthetic fiber-reinforced concrete uses plastic and nylon fibers to improve the concrete's strength. In addition, the synthetic fibers have a number of benefits over the other fibers. While they are not as strong as steel, they do help improve the cement pumpability by keeping it from sticking in the pipes. The synthetic fibers do not expand in heat or contract in the cold which helps prevent cracking. Finally synthetic fibers help keep the concrete from spalling during impacts or fires.

Natural Fiber Reinforced Concrete

- Historically, fiber-reinforced concrete have used natural fibers, such as hay or hair. While these fibers help the concrete's strength they can also make it weaker if too much is used. In addition if the natural fibers are rotting when they are mixed in then the rot can continue while in the concrete. This eventually leads to the concrete crumbling from the inside, which is why natural fibers are no longer used in construction.

Benefits

Polypropylene and Nylon fibers can:

- Improve mix cohesion, improving pumpability over long distances
- Improve freeze-thaw resistance
- Improve resistance to explosive spelling in case of a severe fire
- Improve impact resistance
- Increase resistance to plastic shrinkage during curing

Steel fibers can:

- Improve structural strength
- Reduce steel reinforcement requirements
- Improve ductility
- Reduce crack widths and control the crack widths tightly, thus improving durability
- Improve impact– and abrasion–resistance
- Improve freeze-thaw resistance

Effects of fiber reinforced concretes:

- Improved durability of the structure
- Increased tensile and flexural strengths
- Higher resistance to later cracking
- Improved crack distribution
- Reduced shrinkage of early age concrete
- Increased fire resistance of concrete
- Negative influence on workability
- Improved homogeneity of fresh concrete

CONCLUSION

The efficient utilisation of fibrous concrete involves improved static and dynamic properties like tensile strength, energy absorbing characteristics, Impact strength and fatigue strength. Also provides a isotropic strength properties not common in the conventional concrete.

It will,however be wrong to say that fibrous concrete will provide a universal solution to the problems associated with plain concrete. Hence it is not likely to replace the conventional structural concrete in total.

Superior crack resistance and greater ductility with distinct post cracking behavior are some of the important static properties of FRC. The enormous increase in impact resistance and fatigue resistance allow the new material to be used in some specified applications where conventional concrete is at a disadvantage.

A new approach in design and in the utilization of this material, to account for both increase in performance and economics is therefore,needed.

References

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