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FIBER REINFORCED CONCRETE WITH RECYCLED AGGREGATE

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INTRODUCTION:

The rapid urbanization in India is driving significant infrastructure development, resulting in an increased demand for land, construction materials, and resources. Currently, aggregate, which is the primary component of concrete providing its mass, is in high demand. Natural aggregates are preferred in the construction of high-rise buildings due to their superior strength, durability, and sustainability. As urban areas expand, the necessity for high-rise structures is growing, prompting the demolition of older bungalows to take advantage of increased Floor Space Index (FSI) compared to previous regulations. Unfortunately, the waste generated from these demolitions is often discarded on land, leading to space occupation and potential land infertility. Substituting natural aggregates with recycled aggregates can lower construction costs while achieving comparable results to natural aggregates, to a certain extent. Previous research conducted by engineers and scientists has indicated that recycled aggregates can be used to replace up to 50% of natural aggregates. To enhance the utilization of recycled aggregates, incorporating synthetic fibers, such as glass fibers, is recommended. This approach not only addresses the disposal issue but also promotes the use of recycled aggregates as a viable construction material. Review studies indicate that the combination of glass fibers and recycled aggregates at specific percentages can enhance the flexural strength of concrete, resulting in a more cost-effective solution.

Concrete is widely utilized as a construction material due to its numerous advantages, including affordability, high compressive strength, and excellent durability. However, it exhibits weaknesses in flexural strength due to its low tensile strength. Research indicates that incorporating glass fiber, up to 1% by weight, can enhance both the flexural strength and split tensile strength of concrete. Given that fiber possesses inherent flexural properties, its integration into concrete significantly improves these characteristics. Many nations have adopted the use of glass fiber in structural construction, as it allows for greater load-bearing capacity in flexural applications and aids in minimizing cracking within the concrete. Below are various types of fibers employed to improve the properties of concrete.

Fig.1: Types of Fibres

Sr. No.	Fibre Type	Use
1	*Cellulose Fibres*	To control and mitigation of plastic shrinkage cracking.
2	*Glass fibres*	Architectural applications and modified cement-based panel structures.
3	*Macro-Synthetic fibres*	Suitable alternative to steel Fibres
4	*Micro-Synthetic Fibres*	The protection and mitigation of plastic shrinkage cracking in concrete
5	*Natural Fibres*	Reinforce cement-based products in non-commercial applications
6	*Poly-Vinyl Alcohol (PVA) Fibres*	Alter the flexural and compressive performance of concrete
7	*Steel Fibres*	Enhanced toughness and post-crack load carrying capacity

SCOPE OF WORK:

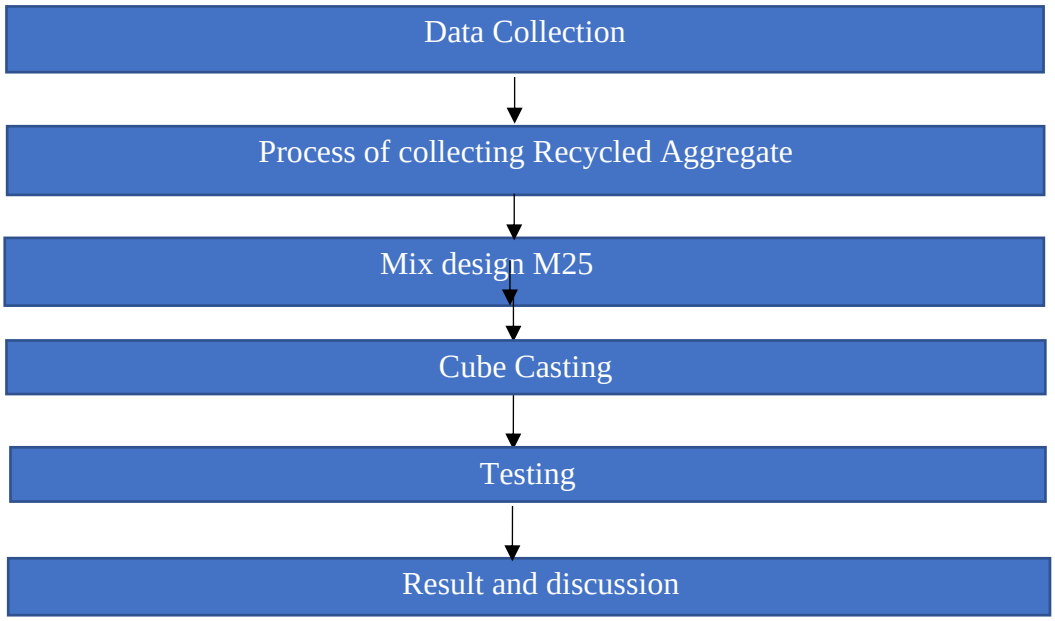
- Provision of a sustainable source of raw materials.
- Reducing waste material from the environment.
- Sustainable development with demolition construction waste.
- Development of construction with recycle aggregate

MATERIAL AND METHOD:

3.1 Material

1. **Glass Fibre:** Glass fibre is material made up of several fine fibre of glass. It reduces crack in concrete.
2. **Mould:** A container into which a liquid or material is poured. The liquid then solidifies (sets) into the same form as the container. In our capstone project, we're making use of a stainless steel mould.
3. **Cement:** Cement is fine grey powder used in concrete. Cement is mixture of calcareous and argillaceous material burnt becomes hard when water is added in cement. Here in our case we are using 43 grade OPC cement.
4. **Sand:** Sand is naturally occurring granular material composed of finely divided rock and mineral particle. We are using Crushed sand or river sand depending on availability of material.
5. **Water:** - We use locally available water for mixing the concrete.
6. **Recycled course aggregate:** Recycled course aggregate by making it free from dirt.

METHODOLOGY:



Conclusion :

Fiber-reinforced concrete with recycled aggregate is a promising material for sustainable construction. It combines the environmental benefits of using recycled materials with the performance enhancements provided by fibers. However, challenges related to mix design, cost, and performance variability need to be carefully managed for optimal results. With further research and development, this material has the potential to play a major role in green building practices.

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