IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Comparative Study Of Normal Concrete And Rubberized Concrete

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ABSTRACT :- In today's world, the number of vehicles is increasing, which makes the disposal of used tires a significant problem. Tires do not easily decompose and can harm the environment. Therefore, it is important to find ways to reuse or repurpose tires. One solution is to use tires in concrete. Waste tires can be utilized by modifying rubber chips and replacing the coarse aggregate. This study investigates the use of waste tires in M25 grade concrete at 7%, 10%, and 12%.

KEYWORDS :- Aggregate, Compressive strength, Concrete, Rubber tyre, workability, solid waste management, Mechanical properties, Crumb rubber, Rubberized concrete, slump cone Waste Rubber tyre (WRT), cement, Rubcrete.

INTRODUCTION :-

Concrete has long been a cornerstone material in construction due to its strength, durability, and versatility. Traditional concrete, composed primarily of cement, aggregates, and water, has been used in a myriad of applications, from residential buildings to large-scale infrastructure. However, the quest for more sustainable and innovative construction materials has led to the exploration of alternative formulations.

One such alternative is rubberized concrete, which integrates recycled rubber particles—typically from used tires into the traditional concrete mix. This adaptation not only aims to improve the mechanical and thermal properties of concrete but also addresses environmental concerns associated with tire waste.

This project undertakes a comparative study between conventional concrete and rubberized concrete to evaluate their performance, durability, and overall viability in construction applications. The primary objectives of this study are to:

1. Assess Mechanical Properties: Evaluate the compressive strength, tensile strength, and flexural strength of rubberized concrete in comparison to traditional concrete.

2. Examine Durability: Investigate how rubberized concrete withstands environmental factors such as moisture, temperature fluctuations, and chemical exposure compared to conventional concrete.

3. Analyze Environmental Impact: Explore the sustainability benefits of incorporating recycled rubber into concrete, including its impact on waste reduction and resource efficiency.

4. Evaluate Cost-effectiveness: Consider the economic implications of using rubberized concrete, including material costs, long-term maintenance, and potential savings.

Through a series of experimental tests and analyses, this study aims to provide a comprehensive understanding of how rubberized concrete performs relative to its traditional counterpart. The findings are intended to offer insights into the potential advantages and limitations of rubberized concrete, guiding future research and practical applications in the field of construction.

Plain cement concrete [PCC] : - It is a construction material made by mixing cement, water, and aggregates (such as sand and gravel or crushed stone) without the addition of reinforcing materials like steel. It is primarily used for structural applications such as foundations, floors, and pavements, providing a strong and durable surface. PCC is known for its compressive strength, but it has limited tensile strength, making it less effective in applications where bending or tension forces are present.

Fig. 1 Concrete

Fig. 2 Cube Mould

Fig. 3 Cube

Rubber concrete :- Rubber concrete is a type of concrete that incorporates rubber aggregates, typically derived from recycled tires, into the concrete mix. This innovative material aims to improve certain properties of traditional concrete, such as flexibility, impact resistance, and thermal insulation.

Rubber concrete is often used in applications like pavements, sidewalks, and various construction projects where shock absorption and durability are important. The inclusion of rubber can also help reduce the overall weight of the concrete and contribute to sustainable building practices by recycling waste materials.

Fig.4 Rubber cube

Fig.5 Crumb Rubber

Literature Review:-

1] Vaishali Kesalkar, et.al.2022 :- The research explores the use of waste rubber as a coarse aggregate replacement material in concrete, aiming to protect the environment from rubber pollution and quarrying. The study proposes replacing fine and coarse particles with tyre rubber, focusing on its compressive strength and mechanical qualities. The M25 grade concrete specimen was used as a reference.

2] T.ishwariya , et.al.2016 :- The abstract discusses the environmental issues caused by waste tyre rubber disposal due to increasing automobile usage. Countries ban landfill disposal, leading to research on recycling waste tyre rubber for its light weight, elasticity, and energy absorption properties. The study compares compressive strength of normal concrete and rubberized concrete beams.

3] S.D.Jandar et.al.2018 :- The study explores the use of tire rubber in concrete production, a non-biodegradable waste, to recycle and conserve natural resources. It found that while M25 grade concrete with fly ash reduced strength, it is suitable for architectural applications with medium to low compressive strength, demonstrating its potential for environmental sustainability.

4]A. Chandran et.al.2017 :- The study explores the use of rubberized concrete as a sustainable alternative to traditional tire disposal methods. It evaluates the impact of tire chips on concrete strength, potential uses, barriers, and advantages, highlighting its suitability for future research and practical applications.

5] Hesham M.Fawzy et.al.2020 :- This paper reviews rubberized concrete mixes, their properties, and their use in structural elements. It discusses their strength, ductility, and resistance to freeze-thaw, sulphate, and acid attacks. The most common structural member is Rubberized Concrete Filled Steel Tubes (RUCFST), which can be strengthened and repaired with different types of Fiber Reinforced Polymers (FRP), enhancing ultimate strength and ductility.

6] Jeevana et al. 2023 :- Partial replacement of coarse aggregate with crumb rubber chips in the preparation of concrete. This crumb tyre aggregate is added as 5%, 10%, 15% to replace the coarse aggregate. In this study, workability and compressive of rubberized concrete was evaluated to investigate the optimal use of crumb rubber as coarse aggregate in concrete.

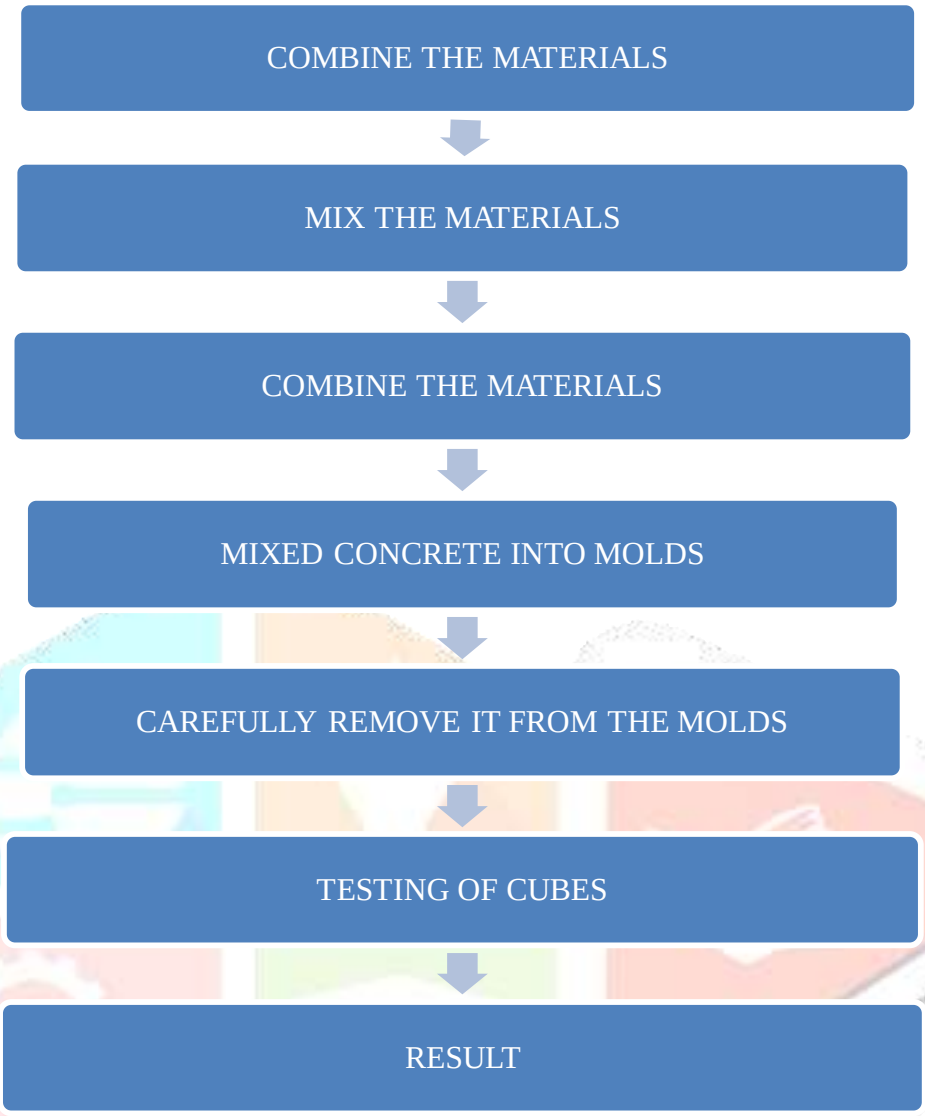
7] Badugu Manisha et al. 2024 :- This study examines the behavior of rubberized concrete, where rubber tires are partially replaced with coarse aggregate, using M30 grade concrete as a reference. The study evaluates compressive strength and split tensile to determine the optimal use of rubber tire aggregate.

8] Manjula Bai K et al. 2023 :- The construction sector often uses industrial or agricultural waste materials as raw materials, promoting sustainability and reducing environmental contamination. A study involving M30 grade concrete samples, three conventional cubes and 27 replacement cubes, evaluated compression strength and split tensile strength after using fly ash and crumb rubber as partial replacements. The study found that these materials can reduce environmental contamination and improve the quality of concrete.

9] Er. Yogender Antil et al. 2014 :- The proposal involves a comprehensive laboratory study on the use of waste material products like worn-out tires in the preparation of fibrous concrete. The study aims to investigate the strength behaviour, compressive and flexural strength, and impact resistance of rubberized concrete with different volume of crumb rubber, as well as the relationship between stress and strain.

10]Abhay kumar et al. 2017 :- The study explores the use of scrap tire rubber in concrete preparation, aiming to protect the environment and reduce waste. M20 grade concrete is used as a reference specimen, and rubber waste is powdered into fine crumb. The aggregate is added at varying rates, ensuring workability, homogeneity, compressive and flex strength of the rubberized concrete.9657435243 call on this number if any quiry.

METHODOLOGY:-



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