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Performance Evaluation of Polypropylene Fiber Reinforced Concrete Made with RHA for Rigid Pavement

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ABSTRACT

To study the strength of concrete by partial replacement of cement and course aggregate using RHA(0 to 20%) and 0.5% Polypropylene Fiber. Concrete has better resistance in compression while steel has more resistance in tension. There are many forms of agriulture by-products and waste materials. The use of such materials in concrete not solely makes it economical, but also helps in reducing disposal considerations. RHA is taken from In this research work, RHA is an agricultural by-product obtained from the burning process of rice hull. It shows decrement of 59 mm. Concrete on 15% replacement of cement with RHA and 0.5% Polypropylene Fiber replacement of course aggregates, 28 days compressive strength obtained is 40.26N/mm2, Split Tensile strength obtained is 7.04 N/mm2 and Flexural strength obtained is 4.49N/mm2 in M35 grade.

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INTRODUCTION

The concrete having cement, sand and coarse aggregates mix up in an appropriate percentage in addition to water is called cement concrete. Concrete has better resistance in compression while steel has more resistance in tension. Conventional concrete has limited ductility, low impact and abrasion resistance and little resistance to cracking. A good concrete must possess high strength and low permeability. Hence, alternative Composite materials are gaining popularity because of ductility and strain hardening. To improve the post cracking behavior, short discontinuous and discrete fibers are added to the plain concrete.

RIGID PAVEMENT

A rigid pavement is constructed from cement concrete or reinforced concrete slabs. Grouted concrete roads are in the category of semi-rigid pavements. The design of rigid pavement is based on providing a structural cement concrete slab of sufficient strength to resists the loads from traffic.

IRC 44: 2008 recommends, minimum M40 grade of concrete (flexural strength 4.5 MPa) for construction of normal concrete pavements.

For rural roads M35 grade of concrete (flexural strength 3.8 MPa) is recommended to be used.

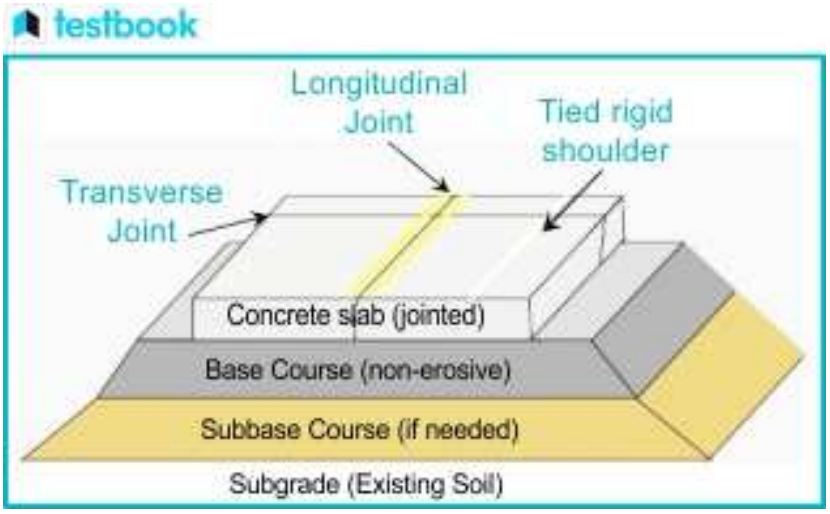

Figure 1. Rigid Pavement Crossectiom

Figure 2. Rigid Pavement Constructions

Objectives

- To study the strength of concrete by partial replacement of cement and course aggregate using RHA(0 to 20%) and 0.5% Polypropylene Fiber.

Slump Test

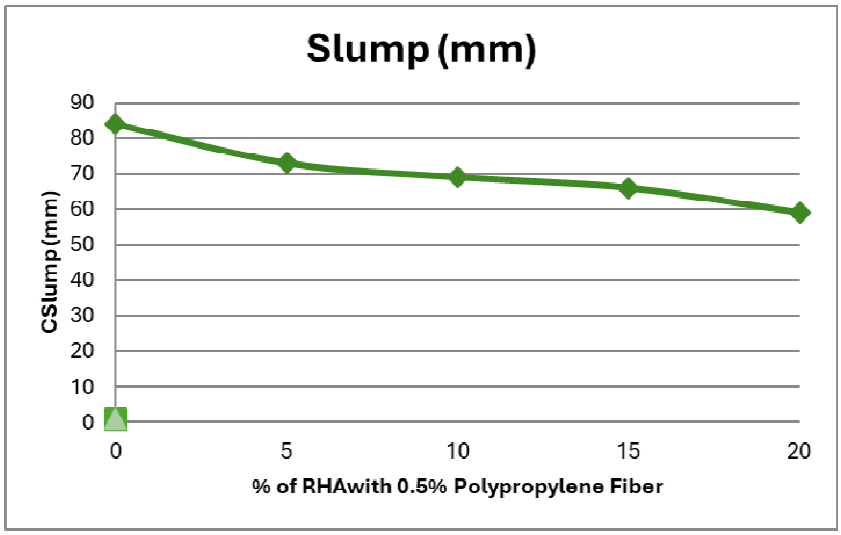

Figure 3. Slumps of M-35 Grade RHA with% Polypropylene Fiber

Discussion: By analyzing the slump value, it is understand that the slump value is always decreases by increasing the percentage of the RHA with% Polypropylene Fiber using.

COMPRESSIVE STRENGTH TEST

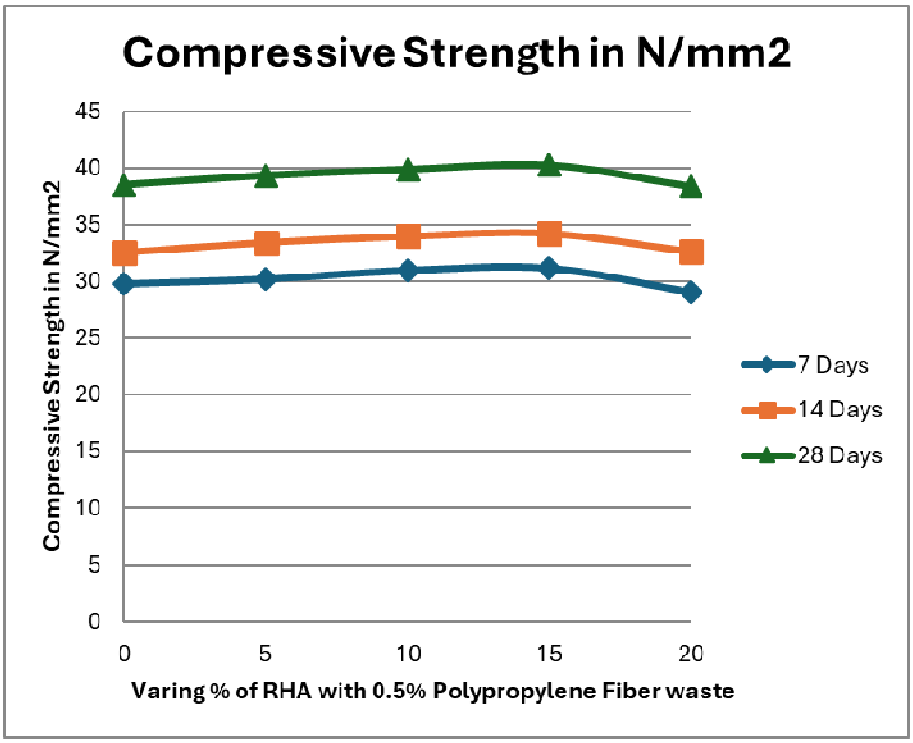

Figure 4. Compressive Strength of M-35 Grade Concrete Varing % of RHA with 0.5% Polypropylene Fiber waste

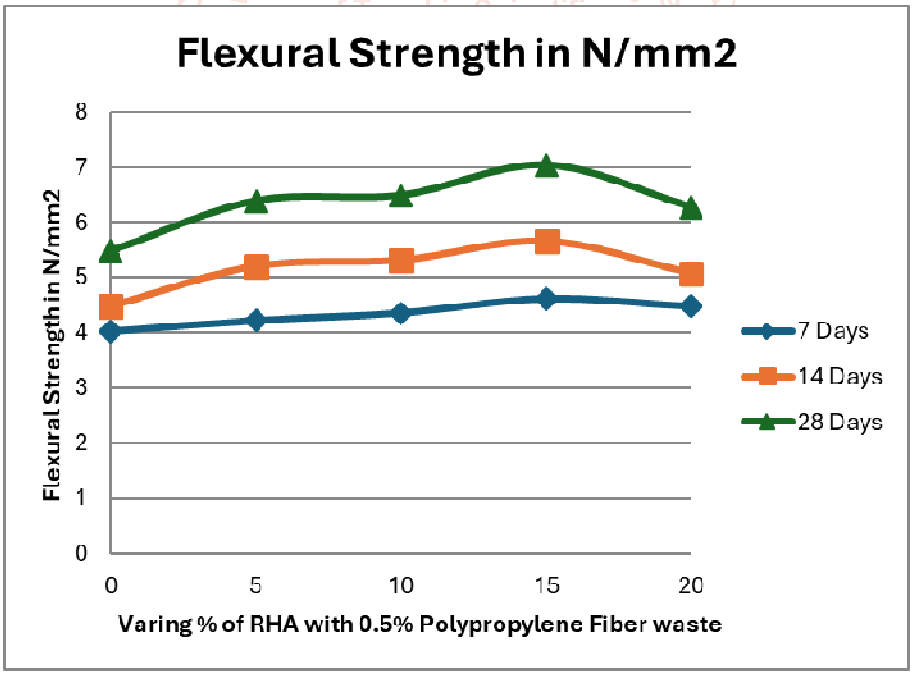

Figure 5. Flexure Strength of M-35 Grade % of RHA with 0.5% Polypropylene Fiber waste

SPLIT TENSILE STRENGH TEST

The result of the split tensile strength with the M 35 grade of the concrete shown in the Table.

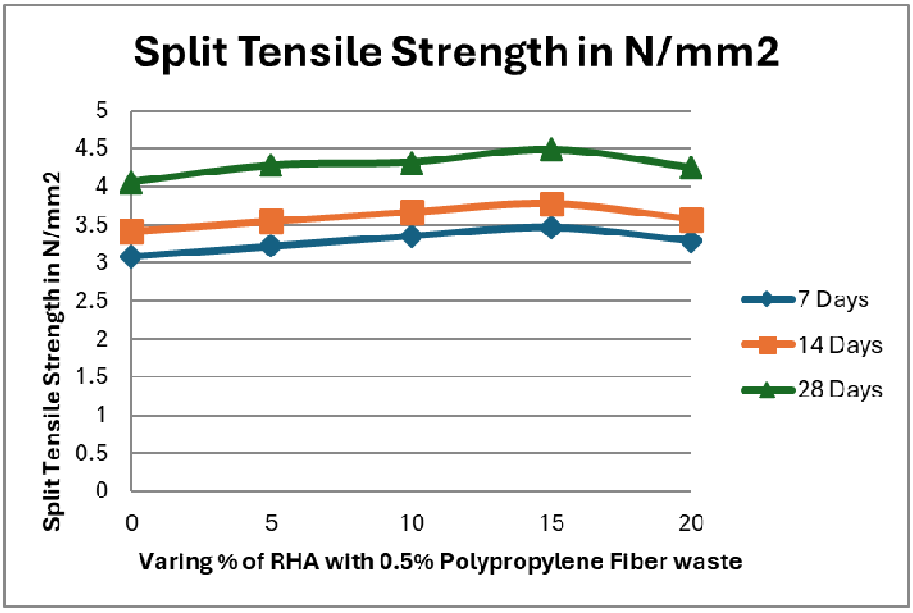

Figure 6. Split Tensile Strength of M-35 Grade % of RHA With 0.5% Polypropylene Fiber waste

Conclusion-

Utilization of RHA and its application are used for the development of the construction industry are to be improvised. It is concluded that 0.5% Polypropylene Fiber with RHA may be used in concrete up to 15% there by it improves the strength as well as saves the natural resources.

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