IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 4, June 2025
Impact Factor: 7.67

Mechanical Properties of Fiber Reinforced Roller Compacted Concrete with Partial Replacement of Cement by Bagasse Ash

[1]Mr. L. K. Lahamge, [2]Mr. Mahiraj Shaikh, [3]Mr. Prashant Chavhan, [4]Mr. Krushana Ilag, [5]Mr. Yash Salve

Assistant Professor, Department of Civil Engineering[1]
Students, Department of Civil Engineering[2,3,4,5]
Pravara Rural Engineering College, Loni, Maharashtra, India

Abstract: *This project explores the incorporation of bagasse ash, a by-product of sugarcane processing, as a supplementary cementitious material in roller-compacted concrete (ROCC) for rural road construction. This study examines the effects of replacing 15%, 30%, and 45% of cement with bagasse ash, combined with the addition of synthetic fibers at 0.25%,0.50% and 0.75% by volume. The aim is to enhance both the sustainability and performance of ROCC.*

Bagasse ash contributes to the sustainability of the concrete by recycling agricultural waste, reducing the need for cement, and lowering carbon emissions. It also improves the mechanical properties of the concrete, such as its compressive strength and durability. Synthetic fibers enhance the tensile strength and crack resistance of the ROCC, providing greater flexibility and toughness compared to normal concrete. To evaluate the performance of the developed mixes, we conducted tests on compressive strength, flexural strength, and split tensile strength. A consistent water-cement ratio of 0.39 was maintained to achieve zero slump concrete, appropriate for roller- compaction. The fine aggregate to coarse aggregate ratio was adjusted between 0.45 and 0.55 to find the optimal balance for workability and strength. The results demonstrated that using bagasse ash significantly benefits the environment and enhances the mechanical properties of ROCC. The inclusion of synthetic fibers further improved tensile strength and crack resistance. These enhancements make the ROCC mixes more durable and cost-effective for rural roads compared to normal concrete roads, which typically lack such improvements in tensile strength and sustainability.This research highlights the potential of utilizing eco-friendly materials in construction, promoting resource efficiency, and long-term durability in rural road development.

Keywords: Bagasse Ash, Synthetic Fibers, Concrete Mix design

DOI: 10.48175/IJARSCT-27693