

## ***Mix Optimization of Blended Mortar Containing Rice Husk Ash (RHA)***

G.D.R.I. Harischandra, K.J.L. Fernando, P.H. Samarajeewa, H.A.D.S Buddika\*,  
H.D. Yapa

*Department of Civil Engineering, University of Peradeniya, Peradeniya, 20400, Sri Lanka*

*\*samithbuddika@eng.pdn.ac.lk*

Global infrastructure development and urbanisation drive demand for cement-related mixtures and concrete. Alternative solutions must be investigated due to the high cost of cement manufacture and its environmental impact. Using supplementary cementitious materials (SCMs) is a viable way to deal with these issues. Through hydration, pozzolanic reactions, or other processes, SCMs can reduce carbon footprint while maintaining or even improving the characteristics of concrete. This study investigates the possibility of adopting rice husk ash (RHA) as an SCM and the challenges associated with its use. RHA, a byproduct of rice production, is proven to be an excellent pozzolanic material. However, due to the lack of technical knowledge and other challenges, Rice husk is often discarded as only a waste. The literature suggests that in mortar production 10-20% replacement percentages of RHA are optimum. Our study examines the viability of substituting RHA (5%-30%) for various percentages in cement mortar and assesses the effects of this substitution on properties such as compressive strength, workability, and durability. According to the literature and our experiments, with the increment of RHA percentages in cement mortar, a gradual decrease in workability was observed. This is due to the porous nature and larger surface area in RHA. However, this can be addressed through various methods, such as using admixtures (superplasticisers) or by adding additional water. With the addition of extra water, there were no substantial reduction observed for the compressive strengths. It can be shown that 15% RHA can be considered as the optimum percentage of cement replacement, considering the compressive strength and its consistency. Furthermore, the variation of fresh and hardened properties of the 15% RHA mix was evaluated with varying water/binder ratios. Further studies on the durability aspects of concrete containing RHA are currently ongoing at the Department of Civil Engineering, University of Peradeniya.

**Keywords:** Sustainability, Supplementary Cementitious Material (Scm), Rice Husk Ash (Rha), Durability, Workability