

Investigation of mechanical properties of grit blasting waste incorporated concrete

Kandanage K.D.A.M., Chathurika H.A., Adikari A.M.P.I, Suraweera B.D.P.D.*,
Pabasara W.G.A.

Department of Engineering Technology, University of Ruhuna, Kamburupitiya, Sri Lanka

A large amount of blasting grit waste is generated from rust and coating removal during ship-repairing industries worldwide. Due to lack of proper waste management mechanisms, it has become an immense environmental issue affecting soil and groundwater. This research targeted to examine the feasibility of incorporating grit waste into concrete partially replacing it with fine aggregates. Different grit waste (unpurified) percentages (5%, 10%, 20%, 30%, 40%) were added to M25 concrete replacing sand and variations in compressive strength and workability were investigated. According to the results, the average maximum compressive strength of 35.40 MPa and 41.93MPa was attained after 7 and 28 days by the sample with 10% grit waste content. Compared to the control sample (with 0% grit waste), it showed an 18% increment and 0.94 % decrement in compressive strength after 7 and 28 days, respectively. Even after adding 40% waste grit, 31. 66 MPa and 39.90 MPa of average compressive strength were achieved after 7 and 28 days respectively, which were higher than the characteristic strength. Moreover, maximum workability was recorded in the sample with 10% grit waste content. Although there were variations in the values, all results are above the standard range. Therefore, it can be concluded that even though there are reductions in compressive strength compared to the control sample, up to 40% reduction of sand can be achieved, as the proposed mixtures had a higher strength than the characteristic strength. Further, it reduces the environmental impact, and cost, and ensures environmental sustainability.

Keywords: Grit blasting waste, compressive strength, construction materials, environmental sustainability

*Corresponding author: piyumi_2018313@fot.ruh.ac.lk