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**Advances in Concrete Construction**

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DOI: <https://doi.org/10.12989/acc.2022.13.6.461>**Effect of granite fines on mechanical and microstructure properties of concrete**

Kishan Lal Jain and Gaurav Sancheti

**Abstract**

Solid waste management is of great concern in today's world. An enormous amount of waste is generated from various industrial activities. Concrete production utilizing some of the potential waste materials will add to the benefit of society. These benefits will include reduction of landfill burden, improved air quality, riverbed protection due to excessive sand excavation, economical concrete production and much more. This study aims to utilize waste granite powder (GP) originating from granite industries as a sand replacement in concrete. Fine GP was collected in the form of slurry from different granite cutting industries. In this study, GP was added in an interval of ten percent as 10%, 20%, 30%, 40% and 50% by weight of sand in concrete. Mechanical assets; compressive strength, flexural strength and splitting tensile strength were prominent for control and blended mixes. Modulus of elasticity (MoE) and abrasion tests were also performed on control and blended specimens of concrete. To provide a comprehensive clarification for enhanced performance of GP prepared concrete samples, scanning electron microscopy (SEM) and X-ray diffraction (XRD) were performed. Results indicate that 30% replacement of sand by weight with GP enhances the mechanical assets of concrete and even the results obtained for 50% replacement are also acceptable. Comprehensive analysis through SEM and XRD for 30% replacement was better than control one. The performance of GP added to concrete in terms of abrasion and modulus of elasticity was far better than the control mix. A significant outcome shows the appropriateness of granite fines to produce sustainable and environmentally friendly concrete.

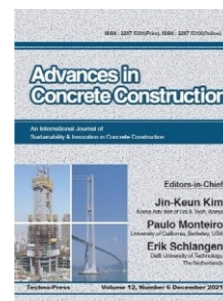
**Key Words**

abrasion; concrete; granite powder; mechanical properties; modulus of elasticity

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