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Chris C. Ramseyer and Roozbeh Kiamanesh	
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16 . ABSTRACT

This research is designed to determine the effect of the mechanically activated fly ash on fresh concrete properties and the ultimate strength of the hardened concrete. Six types of fly ash that are locally available in the state of Oklahoma were used in this research. The activation of the fly ash was performed with a modified ball mill to increase the hydration reaction rate of the fly ash particles. Two primary variables were studied in this research; Grinding duration and the percentage of fly ash as a portion of cementitious material.

The fly ash was ground for 30 and 120 minutes. The ground fly ash was used as a cementitious material in the concrete in various proportions; 20, 40, and 60% of the weight. The strength of each mix was compared with plain Portland cement concrete and the concrete samples with un-ground fly ash to determine any changes.

The results of this study show that the concrete with higher proportions of fly ash has higher workability, although the strength of the samples decreases in most cases if high volume of fly ash is used. However, the results indicate that grinding the fly ash can mechanically active the particles and not only improve the strength of the samples with high proportions of fly ash, but also increase the strength higher than traditional Portland cement concrete.

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