A Greener Shade of Grey: The Effects of Fly Ash in Concrete, a Second Year Study

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Concrete is the most used construction material in the world. Unfortunately, Portland cement, a major ingredient in concrete, has a massive carbon footprint. A coal byproduct, fly ash, has a very similar chemical composition to Portland cement and can be used, at least partially, as a substitute in concrete. Last year, the researchers determined that a 50% fly ash and 50% Portland cement mixture produced the highest quality of concrete, but that concrete took longer to harden than the control of 100% Portland cement concrete. This year the researchers sought to decrease the hardening time of the high fly ash concrete through the use of accelerating admixtures. They treated concrete made with 40%, 50%, and 60% fly ash with chloride or non-chloride admixtures as well as two admixtures not yet available on the commercial market. Samples of each concrete mixture untreated with any admixtures and a 100% Portland cement mixture were used as controls. The samples were tested through a compressive strength test at three days, seven days, and twenty-eight days of curing. Both the chloride and non-chloride accelerating admixtures proved successful at improving the early strength of the concrete, especially in the 40% fly ash concrete samples. Unfortunately the new admixtures, which are not yet available on the commercial market, did not improve the early strength of the concrete a great deal. The researchers recommend using about a 50% fly ash 50% Portland cement concrete treated with a non-chloride accelerating admixture for the highest performing concrete.

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