The Effect of Aggregate Size and Type on the Structural Integrity of Concrete

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The purpose of this experiment was to find an alternative to commercial concrete and determine if results from a previous experiment were due to chance or size of the aggregate. Concrete extraction and transportation harm the environment and account for 4-8% of the total global CO2 emissions, making alternatives to traditional concrete production necessary. Natural rock resources may eventually become depleted, making concrete recycling necessary. This experiment evaluated recycled concrete as a sustainable substitute by comparing aggregate sizes and types. Using recycled aggregates in concrete reduces the carbon emissions from rock blasting and transportation while minimizing waste. Several controlled procedures were followed. Regular concrete with small and large aggregates was prepared, poured, and set 4 times. Recycled concrete was created by crushing previously used concrete into aggregate and mixing it into aggregate-free concrete mix . These samples were also set 4 times. A PSI compression machine measured the strength of regular and recycled concrete with both aggregates. Testing occurred twice: 10 days and 29 days after preparation. All steps followed local concrete waste regulations and strict safety protocols. These results showed regular concrete with large aggregates overall had a slightly higher compressive strength than both recycled concrete mixtures, while small-aggregate regular concrete had the lowest strength. This could be due to the sharper and more jagged texture of recycled aggregate compared to the smoother commercial aggregates. These findings suggest that although large-aggregate regular concrete has a slightly higher compressive strength, recycled concrete remains a sustainable and viable alternative to newly mined rock in construction.

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