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Crumb Rubber Portland Cement Concrete

AzTE Case #M01-052

Inventor

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Background

Concrete mixing and placing processes lead to inevitable voids entrapped in the concrete – typically 1%-3%. Where temperatures vary widely, 5% total air or more is needed to allow the concrete to resist freeze-thaw damage. To achieve this high level of air content, additives known as air entraining agents (AEA) are added to capture the necessary additional air. However, these additives weaken concrete, requiring the use of more cement to compensate. This drives up the price of concrete substantially, as cement is the costliest ingredient.

Invention Description

Researchers at Arizona State University have developed an improved concrete mixture to address this problem. Specific quantities of crumb rubber are added to the concrete mix. Improved thermal cycling resistance is achieved without the expense of additional cement. Additionally, the concrete is lighter and displays increased traction, reduced contact noise, and superior crack resistance. It is well suited for use in areas where repeated freezing and thawing occur and can also be poured in larger sheets than conventional concrete. As a side benefit, this technology provides an attractive end use for the millions of rubber tires discarded each year.

Intellectual Property Status:

U.S. Patent 6,695,909

Potential Applications

- **General Concrete Construction** – Sidewalks, parking lots, and roadways will last longer when created with crumb rubber concrete
- **Large-Pour Concrete** – Items such as tennis courts can now be poured in a single slab, eliminating 'section' lines which must be smoothed after curing
- **Lightweight Concrete Products** – Roofing tiles and other concrete products can now be made lighter

Benefits and Advantages

- **Improved Crack Resistance -** Impact or other damage is locally contained and does not propagate
- **Reduced Weight –** Substantial weight savings compared to ordinary concrete
- **Improved Durability** –Less likely to crack and shatter under repeated freeze / thaw cycles
- **Promotes Recycling** – An economical use for the millions of discarded vehicle tires waiting for recycling
- **Low Cost –** Costly additional cement is eliminated

Contact

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