

# Development of Self-Healing Mechanism in Concrete using Chemical Agents

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**Abstract:** Concrete is a widely used construction material, but its durability is compromised by crack formation due to shrinkage, mechanical loading, or curing defects. This study investigates the self-healing properties of concrete using epoxy resin as a chemical agent. A 10% epoxy resin by weight of cement was incorporated without a hardener to enhance compressive strength, flexural strength, and crack-healing efficiency. Experimental results showed significant improvements in compressive strength (up to 34% at 3 days), flexural strength (7.4% for one-point loading and 43% for two-point loading), and self-healing efficiency. Ultrasonic pulse velocity (UPV) testing further confirmed the superior quality of epoxy-modified concrete. These findings highlight the potential of epoxy resin as an economical and effective self-healing agent for improving the performance of structural concrete.

**Keywords:** Concrete.