

Development of Cementitious Materials for Railroad Crossties

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Abstract

Durability and strength are critical factors of concrete railroad crossties. Although AREMA [1] requires at least a 10-year life cycle, complex loadings and impacts can accelerate durability issues. Due to this, a solution to develop “stronger” and more “durable” concrete is necessary, which life cycle is longer than the specified. While new cementitious materials have been proposed (e.g., geopolymer, carbon nanotube) to improve both structural and durability performances, economic efficiency is also critical in crosstie manufacture. Therefore, this research is to develop effective high-performance cementitious materials with a ternary mixture and non-metallic fibers customized for concrete crossties. The developing materials demonstrated high structural performance (e.g., mechanical property and impact resistance), resistance of corrosion, and crack propagations.

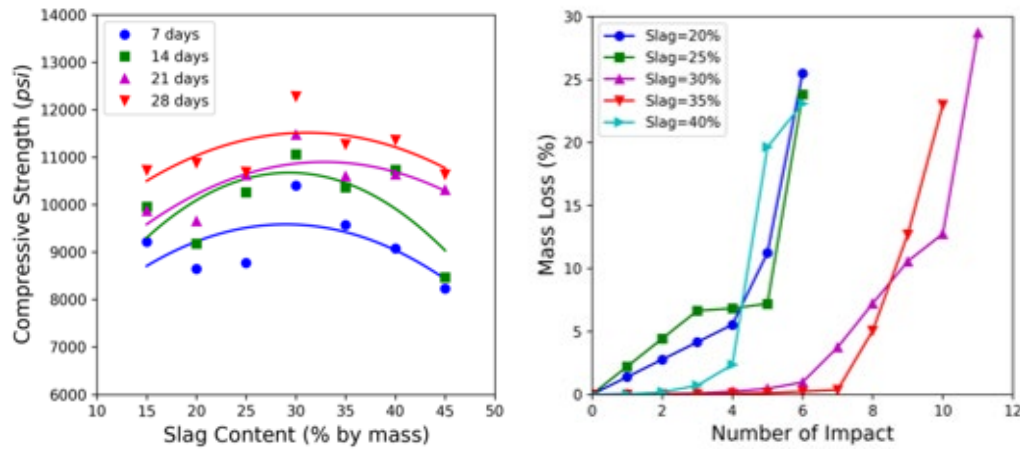


Figure 1: Optimal content of Ground Granulated Blast Furnace Slag (GGBFS) with respect to compressive strength (Left) and Impact resistance of the developing concrete (Right)

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References

[1] American Railway Engineering and Maintenance-of-Way Association, “2012 Manual for Railway Engineering: Chapter 30 Ties,” 2012.