



## Shrinkage and Fatigue Performance of Novel Post-Combined Steel-UHPC Composite Decks

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### Abstract

Considerable UHPC shrinkage has an enormous impact on steel-UHPC composite deck. To this end, a novel post-combined orthotropic steel-naturally cured UHPC composite deck was proposed in this paper. Two full-scale segmental steel-UHPC composite decks, one normal while the other post-combined, were fabricated for shrinkage monitoring and fatigue loading tests. The monitoring results showed that shrinkage-induced secondary stress on the steel deck of the post-combined specimen was lower than that of the normal one. And the fatigue loading test results showed that there was no significantly worse damage on the rib-deck weld detail in the post-combined specimen. In other words, the post-combined method mitigated UHPC shrinkage restraint without obvious deterioration to fatigue resistance. It contributed to establishing an economical alternative that could effectively address the adverse shrinkage effect on a steel-UHPC composite deck.

**Keywords:** steel-UHPC composite deck, post-combined method, shrinkage effect, group studs, fatigue damage