

Prediction Models of Interface Shear Resistance of Clustered Shear Connectors for Precast Concrete Deck Systems

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Abstract:

The use of full-depth precast concrete deck systems in bridge construction have been increasing in recent years due to their high production quality, reduced construction duration and its impact on traveling public, possible weight reduction, and lower life-cycle cost. Precast concrete deck systems can be either composite or non-composite with the supporting steel/concrete girders. Composite systems are more common due to their superior structural performance and reduced overall superstructure depth and cost. Most of the composite system require the use of clustered shear connectors to reduce the number of field-cast connections and simplify panel production and erection. The current prediction models of interface shear resistance in most bridge design codes were developed for continuous shear connectors in cast-in-place bridge deck systems. There is a need to evaluate the accuracy of these models when used to predict the interface shear resistance of clustered connectors. In this study, the results of 146 experiments conducted in North America, Europe, and South Korea were used to compare the accuracy of the prediction models provided by AASHTO LRFD, Eurocode-4, CSA-S6, and fib MC design codes. Comparisons indicated that the fib MC prediction model provides the closest predictions to the measured data. Parameters affecting the interface shear resistance of clustered shear connectors were also identified.

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