

Title: Dynamically resilient steel-concrete composite super-structure for rapid transportation (Dyna-Com) (NCP040302)

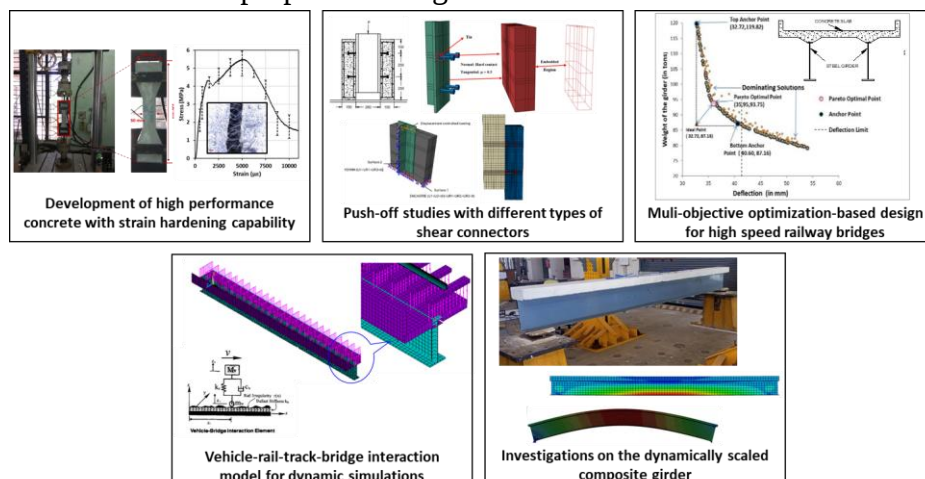
Duration: April 2024 to March 2026

Deliverable

Development of steel-high performance concrete (HPC) composite bridge girder system for rapid transportation

Significant Achievements

- Development of high performance concrete with superior tensile performance (tensile strength-5.49 MPa, strain capacity-9000 $\mu\epsilon$ and strain hardening capabilities). The developed material also exhibited improved crack tolerance, energy dissipation capacity and damping performance.
- Numerical simulations have been carried out on the steel-HPC composite systems with different types of shear connectors to evaluate their shear capacity, bond-slip response and failure mechanisms leading towards design guidelines for composite systems using non-aggregate based cementitious composite.
- Computational procedure has been established to evaluate the dynamic response of bridge structures under train loading through detailed vehicle-track-bridge interaction analysis using Wheel Rail Contact (WRC) element.
- A methodology has been formulated for design of a steel-concrete composite bridge girder for high speed railway applications considering Japanese live load models and IRC codal provisions. Further, a multi-objective optimization framework was adopted, in order to achieve a more efficient configuration for rapid transportation.
- Methodolgy has been established for dynamic scaling of steel-concrete composite (bi-material) girder system towards laboratory scale investigations on the dynamic characteristics of the proposed configuration.



Team:

Dr. B.S.Sindu (PI)

Dr. M. Kannusamy (Co-PI)

Dr. Saptarshi Sasmal

Shri. K. Saravana Kumar

Shri. A.M. Sarath