

Fatigue of reinforced UHPFRC element and monitoring of existing bridges

Case specific load models for bridges – monitoring guideline

- Influence of duration of monitoring on results
- Translation of monitoring results into long-term behaviour

Intervention plan using UHPFRC (out of scope)

- Cost-effectiveness of solution
- Feasibility study

Design and verification of R-UHPFRC under cyclic loading – resistance model

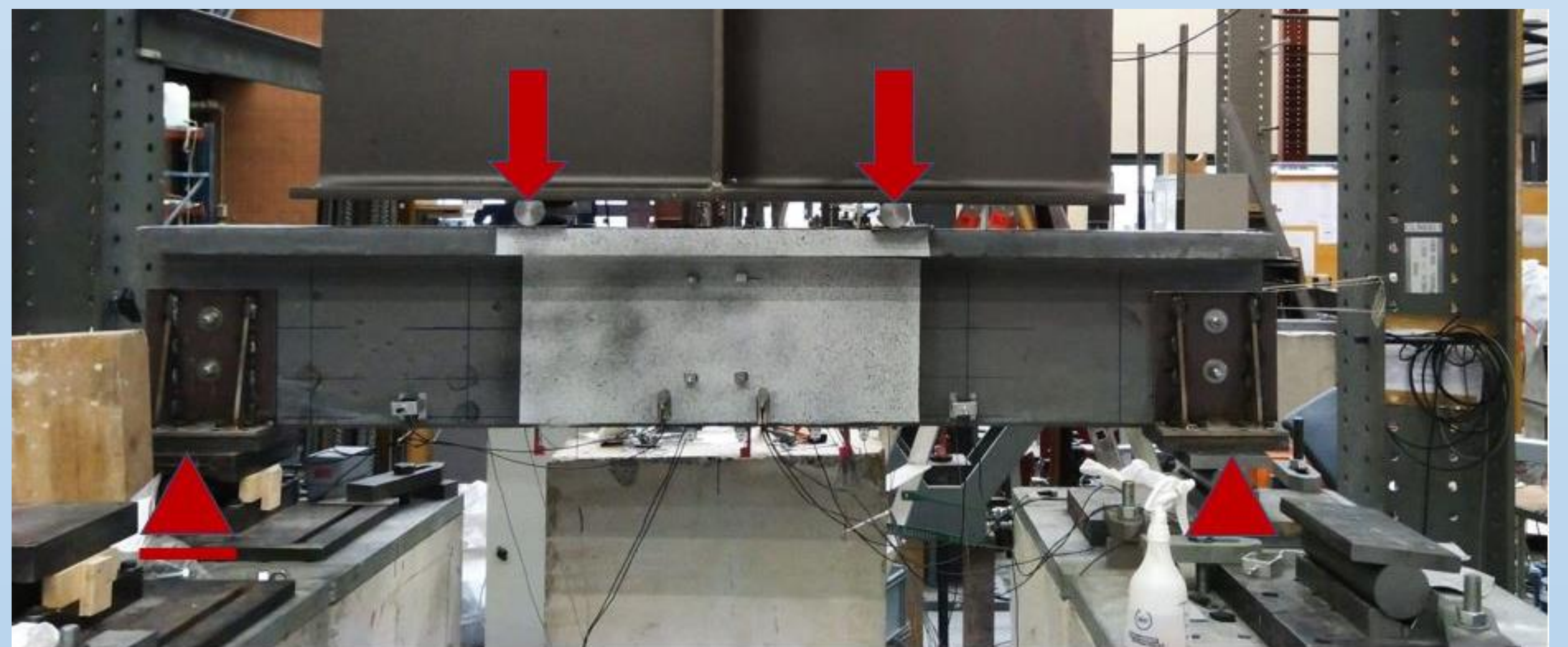
- Fatigue behaviour of R-UHPFRC
- Probabilistic fatigue model of UHPFRC

What is the most economical way of monitoring of road bridges?



- Based on 3 years long monitoring of Chillon highway viaduct (Switzerland)
- Analysis of seasonal effects influence on structural response
- Link between fatigue relevant loads and EVT extrapolation variation
- Partial factor to reflect monitoring results reliability for verification of structures
- Use of other monitoring data for results validation (1 year monitoring of highway viaduct in Switzerland, 3 years monitoring of cantonal road viaduct in Switzerland)

What is the stress balance between reinforcement and UHPFRC under fatigue loading?



- Experimental campaign on R-UHPFRC full scale beams
- Specimen fabrication mocking up production of real prefabricated elements
- Direct strain measurements on reinforcement and UHPFRC
- $\varnothing 20$ mm and $\varnothing 34$ mm steel rebars
- Thin cover – half of rebar diameter
- Search for endurance limit
- Backcalculation to link structural and material behaviour
- Fatigue model applicable in reliability analysis on basis of material fatigue testing
- Guidelines for design of R-UHPFRC under fatigue loading