Service life prediction by monitoring of three bridges in Sweden

John Leander
PhD, Researcher, *KTH Royal Institute of Technology*

KTH Royal Institute of Technology

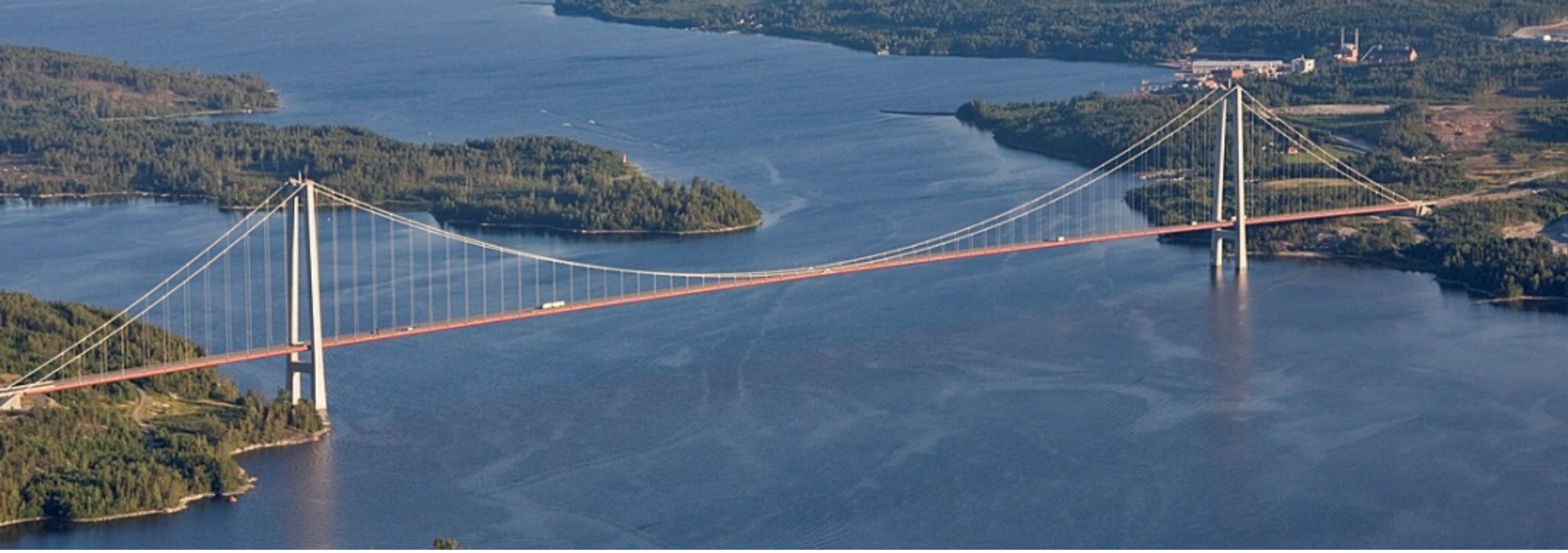
Stockholm, Sweden

Division of
Structural Engineering and Bridges

- ~12 full time employees (professors, postdocs, researchers, laboratory engineers)
- 20 PhD students

Main research topics:

- Advanced modeling and analysis of structures
- Bridges for high speed track
- **Monitoring and condition assessment of bridges**
- Soil–structure interaction
- Life cycle analysis of bridges (LCC & LCA)



The High Coast Bridge

The bridge: A suspension bridge opened 1997, a main span of 1210 m, total length of 1867 m.

Reason: Excessive wear of the bearings.

Monitoring: Bearing forces, longitudinal displacements, traffic camera, hanger accelerations, thermocouple.

Outcome: A plausible explanation for the unexpected wear.

The Söderström Bridge

The bridge: A continuous steel beam bridge for railway traffic opened 1954. A total length of about 190 m divided in six spans.

Reason: Fatigue cracks and an exhausted fatigue life.

Monitoring: Long term measurements of strains for fatigue assessment. A total of 56 strain gauges.

Outcome: A significant increase in the fatigue life using measured response and reliability-based methods.

The Götaälv Bridge

The bridge: One of the oldest welded bridges in Sweden completed 1939. A continuous steel beam bridge for local traffic with a total length of about 950 m.

Reason: Fatigue cracks and an exhausted fatigue life.

Monitoring: Investigate the composite action between the concrete deck and the steel beams. Long term measurements of strains for fatigue assessment.

Outcome: To be used for a study on the composite action between the concrete deck and the steel beams.

Summary

- All three projects have been initiated due to specific problems.
- The purpose of the monitoring campaigns have been to clarify the behaviour of the bridges and the response during service.
- The measured data could together with models for damage accumulation be used to quantify the health of the structures.