

AKUSTAHL

Development of a monitoring system based on acoustic emissions for micro-crack prediction in steel structures subjected to fatigue loads

The increasing ageing and overstressing of bridges in the German trunk road network is leading to an increasing need for renovation, with a lack of innovative monitoring systems for the early detection of damage. The AKUSTAHL research project aims to further develop acoustic emission analysis (AE), a non-destructive method that detects the formation of microcracks through acoustic signals. By refining this technique, a monitoring concept for micro-crack prediction in steel components subject to fatigue loading is to be developed in order to detect major damage at an early stage and extend the service life of bridges, cranes, offshore or industrial structures.

The following questions are fundamental:

- What are the requirements for a monitoring system for the detection of microcracks and is a modification of the existing sensors necessary?
- How can the resulting cracks be safely and reliably detected and described using an acoustic signal?
- How can the acoustic signal be correlated with the resulting crack energy and reliably calibrated?
- Can the measurement methodology be transferred to the component scale with different levels of complexity?
- How can AE sensor technology also be a component of complex, holistic monitoring systems for different steel structures?

At the AMT, we are particularly pleased to make a contribution to increasing the competitiveness of SMEs with this project. Many of these companies do not have the resources to develop their own non-destructive testing methods, which is why our approach offers a decisive improvement. By applying the research results in practice, SMEs can make their monitoring and maintenance processes more efficient and cost-effective, which strengthens their position in national and international competition and opens up new business opportunities.