

Project Statostruc 2

Condition assessment of bridges by analytical and numerical methods

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Do you drive on deficient bridges? The state of the existing bridge structures presents a major problem not only in Europe, but worldwide. Each year, Germany invests more than 300 million euros in the maintenance of bridges, while Britain invests over 220 million euros. USA needs more than 76 billion US dollars for the rehabilitation of damaged bridges. In Germany, the total rehabilitation requirement amounts in the double-digit billions. The problem is that the service life of bridges expires faster than they can be rehabilitated. Therefore, the development of an optimal maintenance management connected to appropriate techniques to assess is more important than ever.

Within the research project “condition assessment of bridges by analytical and numerical methods”, an algorithm has been developed, which contribute to the state of the art of reliable condition assessment of bridge structures. The proposed method is the Deformation Area Difference Method (DAD-Method), which is based on conventional static load deflection experiments. The particularity of the DAD-Method is to combine the advanced finite element method with modern measurement techniques to analyse the load deflection behaviour of bridge constructions both computationally and experimentally. The aim of the process is to enable the detection and localisation of the stiffness reducing damages that cannot be discovered by visual bridge inspections. The applicability of the DAD-Method has already been demonstrated by theoretical calculations as well as by a laboratory experiment.

In the further process, the method will be further developed not only to locate the damage, but also to assess the degree of damage. The applicability will be further optimized by application of recent technical devices and technologies like the use of drones as measuring technique.



Figure 1. Bending failure of laboratory beam



Figure 2. Application of a drone