



## Structural robustness as an extended status indicator in bridge maintenance management systems

Jan Akkermann, Marina Suhm

Karlsruhe University of Applied Sciences, Institute of Applied Research, Karlsruhe, Germany

Contact: [jan.akkermann@h-ka.de](mailto:jan.akkermann@h-ka.de)

### Abstract

In infrastructure assessment in Germany, the main structural inspections classify damage according to intensity, type and influence on stability, traffic safety and durability. The structural capability of bridge structures and parts thereof to react to these damages in a vulnerable or robust manner is a key indicator for the failure probability. The structural robustness of the structure is thus an additional initial information for a qualified condition assessment in maintenance management and for the prioritisation of measures. Originally designed for traffic water structures, the newly developed method for determining the structural robustness and its linkage of damage processes to a "condition class" is transferred to bridge structures. This enables a typological clustering of similar types of structures with regard to damage processes as well as the prioritisation of repair measures in the structure portfolio.

**Keywords:** structural robustness; utilization ratio; recalculation; damage; maintenance management; prioritisation.

### 1 Introduction – maintenance management of bridges

The preservation of Germany's transport infrastructure is one of the current key tasks. With 70% of the budgeted funds, the Federal Transport Infrastructure Plan 2030 for the first time considers preservation to be more important than new construction and expansion.

The main control parameters in maintenance management are condition assessment and evaluation. The regulations for road bridges in the context of codes DIN 1076 and RI-EBW-PRÜF [1] are the basis for individual and portfolio assessments - both for the sovereign area of the Federal Ministry of Transport and at the municipal level. While concerted maintenance and renewal programs for federal trunk roads have improved the problematic

structure ratings (grades > 3.5) [2], the overall rating of the structure portfolio decreases. Figure 1, for example, illustrates an increasing deterioration of the structure ratings on federal highways. The

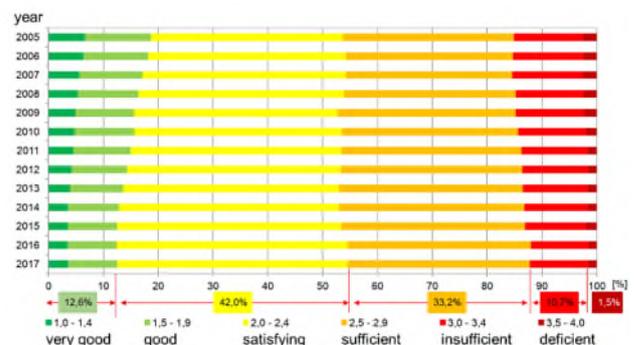


Figure 1. Development of assessment grades on federal motorway bridges [2]