



## Evaluation of expansion joints in Austria

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## Summary

Road expansion joints on motorway bridges are heavily loaded structural elements. Due to ageing of infrastructure, rising traffic loads and structural deficits of older expansion joints, many joints are subject to regular maintenance and do not reach their design service life.

The project EVAF (“Development of wear-resistant expansion joints for bridges”) was set up to develop robust and low-maintenance designs of expansion joints, based on investigations on motorway bridges in Austria. This paper presents results from the first part of the project, where an inspection survey was carried out using manual inspection and data from a routine monitoring device. Expansion joints were assessed based on a damage catalogue, and common damage types were identified. A numerical analysis based on idealized as well as on measured road surface levels shows the dynamic load amplification occurring on expansion joints to give general rules on installation with respect to level differences in the road surface.

**Keywords:** Expansion joints, damage evaluation, RoadSTAR, dynamic load amplification factor, numerical analysis

## 1. Introduction

Expansion joints are responsible for a considerable amount of maintenance costs on bridges. This is even more remarkable as their initial costs are only about 1 % of the overall construction costs of a bridge [1]. Current studies show that over 20% of maintenance costs on bridges are caused by repair and renewal of expansion joints [2], [3]. Indirect costs e.g. due to reduced network availability are more difficult to assess. Due to different requirements (gap width, inclination, traffic loads) and experiences, different types of expansion joints have been developed and are covered within the ETAG 032 [4]. Yet some expansion joints still show frequent damages resulting in a reduced lifetime and early renewal.

The goal of the project EVAF was to develop solutions for robust and low-maintenance expansion joints and technologies which allow repair or replacement with little effort. The working group consisted of the Swiss company mageba sa, the University of Natural Resources and Life Sciences (BOKU) and the Austrian Institute of Technology (AIT), both in Vienna. The funding body of the project was composed of the Austrian highway operator ASFINAG, the Austrian Railways and the Austrian Federal Ministry for Transport, Innovation and Technology. This paper represents the first part of the project, which shows results from a manual inspection survey carried out on 89 expansion joints on highway bridges in Austria (Section 2) conducted by BOKU as well as a numerical analysis which covered the evaluation of the dynamic impact on expansion joints due to uneven road surfaces (Section 3) conducted by AIT. Also data from a routine monitoring device – AIT’s RoadSTAR – was included in the analysis. The results of this project will influence the