



## Improvement of safety on bridges - measured-impact-loads

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### Summary

Bridges are constructed in a way that they ensure safe traffic and that they resist all actions durably. In order to ensure the traffic safety bridges are fitted with safety barriers. The safety barriers usually installed on German bridges are designed to protect lorries up to a weight of 13 t from breaking through the barrier and crashing down the bridge. But in case of accidents with heavier vehicles conventional safety barriers reach the limit of their capabilities. Therefore a research project was initiated in order to obtain safety barriers which are able to protect even heavy lorries from breaking through and crashing down, without simultaneously concerning about unacceptable bridge damages. Within the research project real crash tests of vehicles towards safety barriers were executed - for the first time inclusive measuring all important forces acting on bridges.

**Keywords:** impact loads; design actions; impact tests; safety barriers for bridges; road safety; durability of structures; force measurement

### 1. Introduction

A lorry falling down from a bridge can be regarded as a high danger for the people staying or living beyond the bridges (Figure 1). The safety barriers usually installed on German bridges are able to protect lorries up to a weight of 13 t from breaking through the barrier and crashing down the bridge. But in case of accidents with heavier vehicles conventional safety barriers reach the limit of their capabilities. Therefore a research project was initiated in order to obtain safety barriers which are able to protect even heavy lorries from breaking through and crashing down, without simultaneously concerning about unacceptable bridge damages. These safety barriers have to be designed in a way of being compatible to the principle of German bridge constructions.

In 1998 first studies about safety barriers for very heavy lorries [6] showed that an impact can lead to forces which exceed the capability of bridges significantly. For new bridges this is not a big problem because they can be designed accordingly. But for existing bridges - 37.000 on trunk roads in Germany – this can become a big problem. They are not constructed in a way to resist such high forces. Improving these bridges will take high technical and financial complexity.

In order to find out how intensive the bridge construction is acted in case of a lorry impact it is essential to measure the forces during an impact test. Sequencing a research project [7] will be described within the traffic safety aspect as well as the impact load were assayed.