

## Sustainable development requires risky decisions - problematic 300 ton overweight transport passing a bridge

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### Abstract

Oversize load passages over bridges are one of the research issues related to sustainable development that engineering and scientific teams around the world have to deal with. The article presents the scope of activities that enabled the passage of an oversized vehicle with a total weight of over 300 tons over a reinforced concrete slab. The bridge load capacity is 30 tons. In order to assess the capacity of the bridge, detailed visual inspection, inventory, tests during a load test, field and laboratory tests of concrete, location and inventory of reinforcement, static and strength calculations were carried out. Unfortunately, the tests done during the passage of an oversize vehicle on the bridge showed that the actual weight of the set were greater than originally declared. Fortunately, it turned out that there were still some reserves in the structure load-bearing capacity and the over-weighted vehicle entered the bridge without any damage to its structure.

**Keywords:** reinforced concrete bridge; oversized transport; FEM; GPR; load testing.

### 1 Introduction

One of the research issues related to sustainable development that engineering and scientific teams around the world have to deal with are oversize load passages over bridges. Many of them are several and sometimes even several dozen times heavier than the estimated usable load capacity of the bridge on which they intend to pass. In the case when archival documentation is available, the analysis of the permission for the abnormal transport is often limited to the calculation of the structure's response under the new, extraordinary load scheme only. Unfortunately, the archival documentation is often not preserved, especially for old bridges and those located along roads of minor importance. In such a case, approval of an overweight vehicle passage is quite complicated. The standard calculation and diagnostic methods used by engineers are not sufficient here. In this case, the issuing of a permit to pass the bridge

requires a complementary scientific analysis of the structure response. The problem is extremely important, but quite rarely addressed by researchers [1]–[5]. Therefore, the aim of the paper is to present a representative methodology for assessing the load-bearing capacity of a bridge to allow the passage of an oversize vehicle. The case study presented here enabled the new power station generator to be delivered to the plant in the fastest way.

### 2 The description of the bridge

The road bridge crosses the Piasnica River in the Pomeranian Voivodeship in Poland. It is a two-span continuous reinforced concrete slab with a total length of 13,1 m (Figure 1). The theoretical spans length is  $L_t = 2 \times 6,35$  m.