

Modelling of the load-carrying capacity of concrete bridges combined with in situ monitoring

During the past years, there has been a significant increase in the number and weight of so-called special transporters on Danish roads. These special transporters are vehicles with a weight (or size) that exceeds the limits for vehicles usually allowed on Danish roads. Special transporters must obtain a permit in each case, which is issued by the Danish Road Directorate (or some other road authority). When the permit is issued, it is checked that all bridges on the route to be used by the special transporter have sufficient load-carrying capacity. According to current structural calculations, there is a considerable number of bridges with insufficient load-carrying capacity.

The Danish Road Directorate has carried out a few load-carrying tests of bridges. The results of these tests indicate that the bridges have a considerable higher load-carrying capacity than the one that can be established using the calculation models. In connection with this project, a number of full-scale load-carrying tests of the Danish Road Directorate's bridges are planned. Based on the load-carrying tests, the actual load-carrying capacity of the bridges will be established. The results will also be used as a basis for the development of a calculation model which is consistent with the test results.

The ambition of the research programme is to provide unique empirical data and develop a general method for more accurate load-carrying assessments. That will ensure an improved basis for decisions as to whether a bridge can be upgraded for heavier traffic, needs to be reinforced or torn down.

With the unique knowledge which will be gained during the test and monitoring phase of the project combined with the detailed theoretical modelling, the aim is to establish simpler engineering models which are sufficiently accurate to assess the load-carrying capacity of bridges in combination with optimised test setups and monitoring tools in future.

The business PhD project is part of an ambitious research programme consisting of a total of three PhD projects, two postdoctoral projects and a significant number of master degree projects. The programme will be a co-operation between the Danish Road Directorate, DTU Civil Engineering and COWI.