Demonstration of the guidelines for nonlinear finite element analysis for three prestressed concrete beams

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The Ministry of Infrastructure and Water Management (Rijkswaterstaat) intends to commission the assessment of the shear capacity of a number of concrete bridges, using nonlinear finite element analysis (NLFEA) and the RTD1016 guidelines for nonlinear finite element analysis of concrete structures . The bridges under consideration are constructed with prestressed concrete girders.

This work investigates how well the failure process and the maximum load capacity of three pre-selected experiments with prestressed concrete girders can be predicted by NLFEA. The analyses are performed according to the RTD1016 guidelines. Furthermore, the analyses are performed as 'blind predictions', meaning that the analyst does not have prior knowledge of the experimental results.

In general, the failure mechanisms and the sequence of events are well simulated by the numerical analyses. The presentation will give an outline of the experimental setup and results, the analytical analyses, the nonlinear finite element analyses and the application of the safety formats for nonlinear finite element analyses. Finally, the concluding remarks will be discussed as well as recommendations for the RTD guidelines.