Failure behavior of a prestressed concrete box girder bridge

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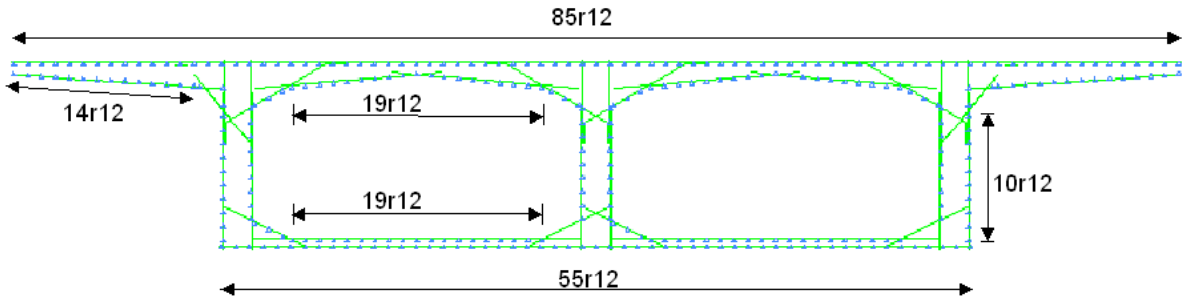
ABSTRACT

A 3D finite element model has been developed to analyze a bridge. The structure composes of a two-cell concrete box girder bridge and comprises five fields of 60 meters. The tapered top slap and beams have been taking into account. The bridge has been prestressed (post-tensioned) in both longitudinal and cross direction. Also embedded reinforcement bars and grids have been used to model the reinforcements.

The main objective of this project is to determine the remaining load capacity of the bridge by increasing the distributed mobile load according to the Eurocode. The failure of the structure will be analyzed. For this purpose a model based on shell elements is used in a nonlinear analysis including two analysis phases. The analysis phases simulate the construction phases. This analysis includes nonlinear effects, such as cracking of the concrete and plasticity of the reinforcements and prestressed tendons. The results of the 3D shell model will be compared with the results of a 2D plane stress model.

Modelling reinforcement

- In longitudinal direction



- At begin/end tendons
- At joint and piers