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Shear Behaviour of prestressed dapped end beams

This (Master)study specifically investigates the shear resistance of vertically prestressed dapped end beams. An analytical study is performed in order to evaluate the influence of vertically prestressing on the failure mechanism and the shear resistance of vertically prestressed dapped end beams. Next, an analytical calculation procedure based on the equilibrium of the "torn-off" section is used to determine the bearing reaction of several prestressed dapped end beams. Additionally, a Case Study is performed to verify if the results of a finite element analysis (FEA) using a highly simplified model are in accordance with the experimental results described in CUR-report 40 of a full size test on a prestressed dapped end beam.

Determining the design shear resistance of vertically prestressed dapped end beams using the equilibrium calculation procedure will give very conservative results.

The finite element model (FEM) used is highly simplified. Only the prestressing cables and Dywidag bars are included in the model and loads are not distributed over multiple nodes. Overall it can be concluded that initiation as well as the direction of crack propagation are simulated quite well. However it is not possible to make realistic statements about crack propagation, crack width and realistic crack strains at different load steps. More important, the calculated bearing reaction is a safe lower limit of the shear resistance.

It is expected that modelling of all reinforcement bars will result in a less conservative shear resistance. Further research is required to verify the statement above.