Abstract DIANA USER MEETING 2013

Fatigue Analysis of Bascule Bridge Detail
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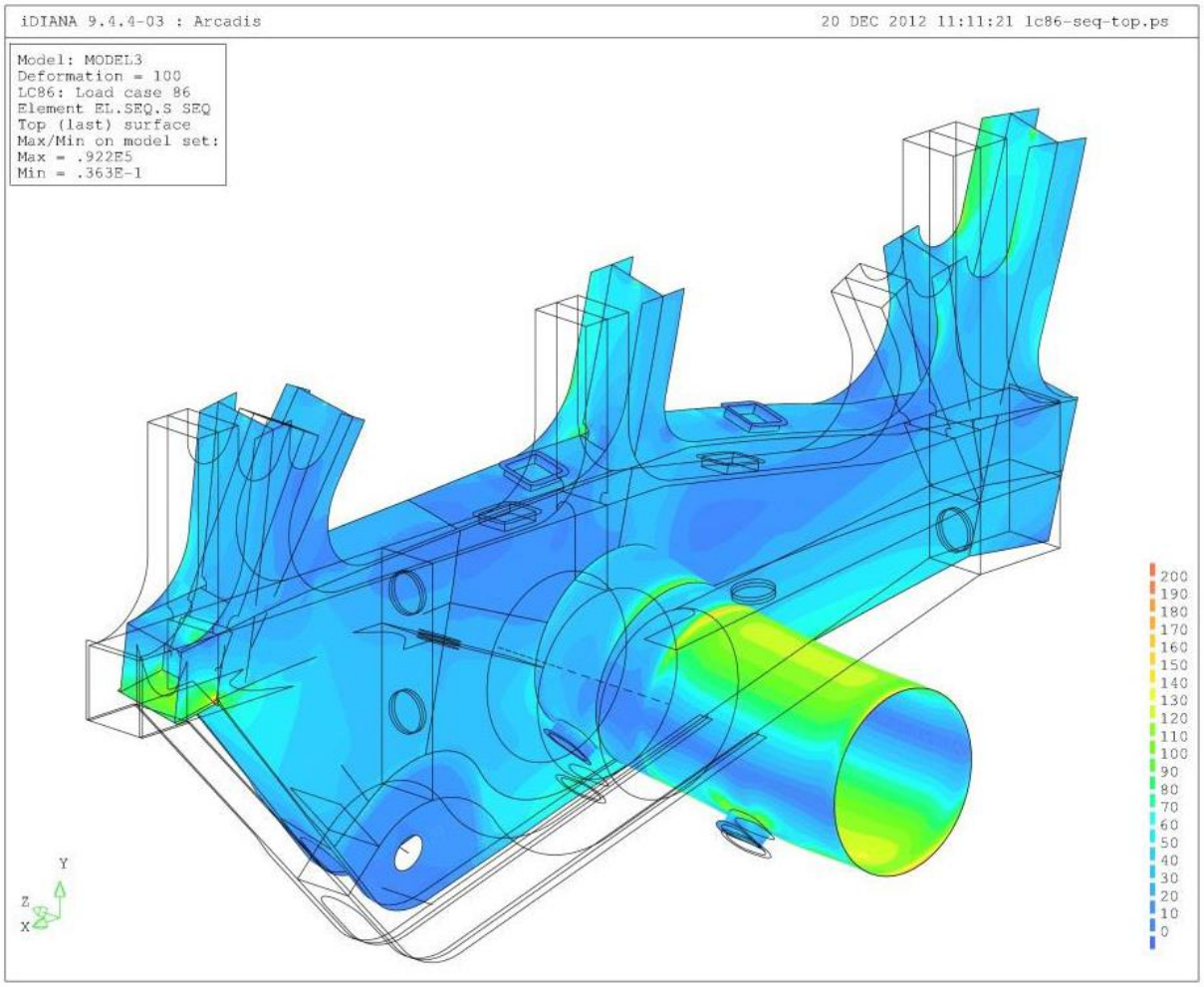
The Port of Antwerp, one of the largest ports in the world, consists of several harbours, most of them located east of the River Scheldt. The single harbour west of the Scheldt is the Waasland Harbour, accessible only through the Kallo Sluice. In order to improve the access of the Waasland Harbour, at present the Second Kallo Sluice is being built, 500 m long and 68 m wide. To avoid blocking of the road traffic two identical bascule bridges are planned with a span of 70 m each. The sluice and the bridges are being constructed by THV Waaslandsluis, commissioned by the Belgian Department of Mobility and Public Works.
Each bridge consists of a spatial lattice girder with an orthotropic steel deck plate. The bridge rotates around a solid shaft (diameter 1,4 m) and is counterbalanced by a ballast box. In closed position the bridge is supported by several supports and the shaft. In opened position the bridge is supported by the axis and jacks only. Hence, by contract, special attention had to be paid to the fatigue check of the cast part around the axis.
The detailed fatigue calculations of the cast part are carried out with two detailed FE models, including all details such as man and mouse holes. With the first shell model the local stress distribution around the cast part was calculated, enabling the fatigue check of the welds in the region around the pivot point. In order to calculate the correct stress state, the section forces from the global lattice girder model had to be transferred to loading on the shell model in a proper way.
The second model consisted of solid elements and represented the cast part and axis itself. Again the correct surrounding stress state had to be applied.
The calculated stress results provided the information to check the fatigue strength of the details and to adapt the design when necessary.
In the presentation attention is paid to the FE models, the location of the boundaries and the application of the correct boundary loads. The fatigue checks will be covered, as well as tips and tricks for this kind of calculations.



Detail model of the region around the pivot point.