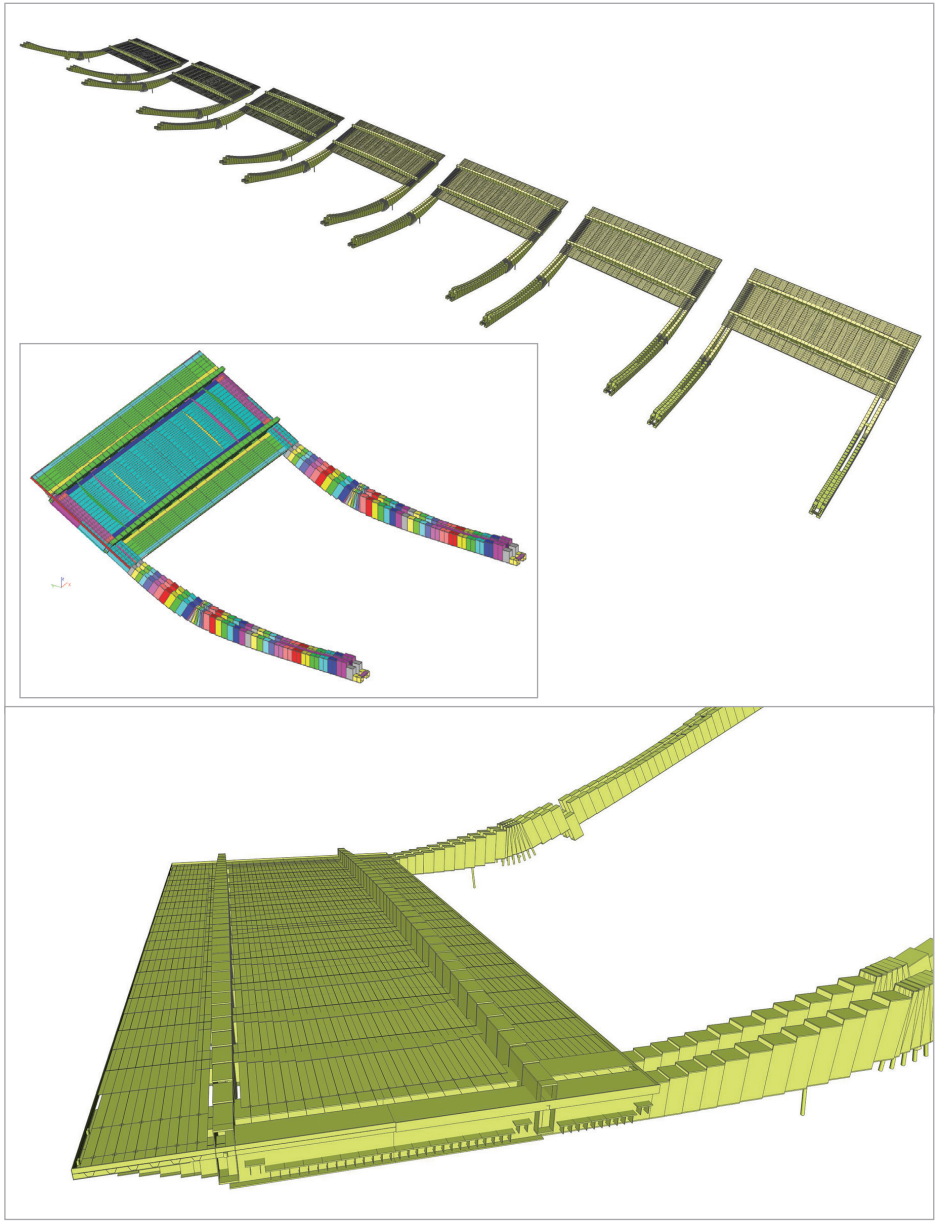
“Scheepsdalebrug” Movable Road Bridge - Brugge, Belgium

Nomination Category 2: Civil Structures



Software: Scia Engineer

Introduction
The movable road bridge at Brugge is built to cross over the Brugge-Oostende channel. The new bridge replaces an old movable metallic bridge of the “Vierendeel” type.

The bridge has the width of 19 m and is a rolling bascule bridge with a movable pivot point. The pivot point has a radius that rolls over the concrete understructure. The bridge is powered by two jacks and the rolling movement of the bridge occurs according to the longitudinal axis of the bridge.
The weight of the bridge (725 tonnes) is balanced by ballast that is positioned in two 15 m-high arms of the bridge. The span of the bridge is 40 m and the bridge has three traffic lanes with two separate lanes for pedestrians and cyclists.

The bridge deck is transported in one piece to the site together with the two arms. On the site the arms are welded to the bridge deck and the bridge is ballasted.

Description of technical questions to be resolved with Scia Engineer
Scia Engineer was used both for the dimensioning of the bridge in the traffic situation and the erection engineering of the bridge.

The complete 3D model was formed with bars, even the orthotropic deck plate, divided into longitudinal and cross girders with an equivalent stiffness and adopted mass. Correct modellisation of the mass was very important because of the balancing of the bridge.

From the engineering point of view this project has several challenges.

First, there were the different states of the bridge to be studied.
The possibility of creating different states of the bridge in one model was a big advantage in terms of calculation of the bridge. With the automatic steel code check (EC) of Scia Engineer it was possible to check all members in all states in one calculation model. This gave an important gain in calculation / optimisation of the structure in the different states.

Second, there was a second order calculation needed for the check of the arms based on a stability calculation.

Third, the use of graphical sections with different material properties so as to model the exact weight of the bridge into the different states of the bridge.

Fourth, the calculation of eigenvalues / frequencies of the bridge in order to check if there were risks of vibration under wind loads.

Fifth, for the erection engineering the different construction stages had to be examined to determine the right camber of the bridge so that the arms could be welded correctly to the bridge deck on site.

Description of how our experience with Scia Engineer proved its completeness
- Dimensioning a 3D structure in different states.
- The possibility of using and combining the results of Scia Engineer in a flexible way.
- The use of graphical sections with different section properties.
- Stability calculation and second order calculations.
- Calculation of eigenvalues.

This project proves the great diversity of Scia Engineer in checking the structure and the use of materials.

Modules used:
- Base
- 3D frame
- Steel code check (EC)
- Stability
- Dynamics

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Integral quality is our top priority

Stendess calculates and draws complex steel constructions in a high quality and efficient manner while seeking economically responsible and sustainable solutions for specific technical stability issues. Thanks to the integral service, whereby the design of the metal superstructure and the concrete substructure are calculated and drawn by experts in the same office. The building owner and principal contractor retain 100% control over the complete structure.

Managing complex projects with care.
Recent references demonstrate the multidisciplinary knowledge and ability of our engineers and designers in the market of bridges, industry, utility and other projects located all over the world.

Project information

Owner	Waterwegen en Zeekanaal afd. Bovenschelde
Architect	Bureau Eggermont - Gent
General Contractor	THV Victor Buyck Steel Construction - Depret - Egemin
Engineering Office	Ingenieursbureau Stendess N.V.
Location	Brugge, Belgium
Construction Period	11/2009 to 05/2011

Short description | **“Scheepsdalebrug” Movable Road Bridge**

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