Ney & Partners

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NOMINATION

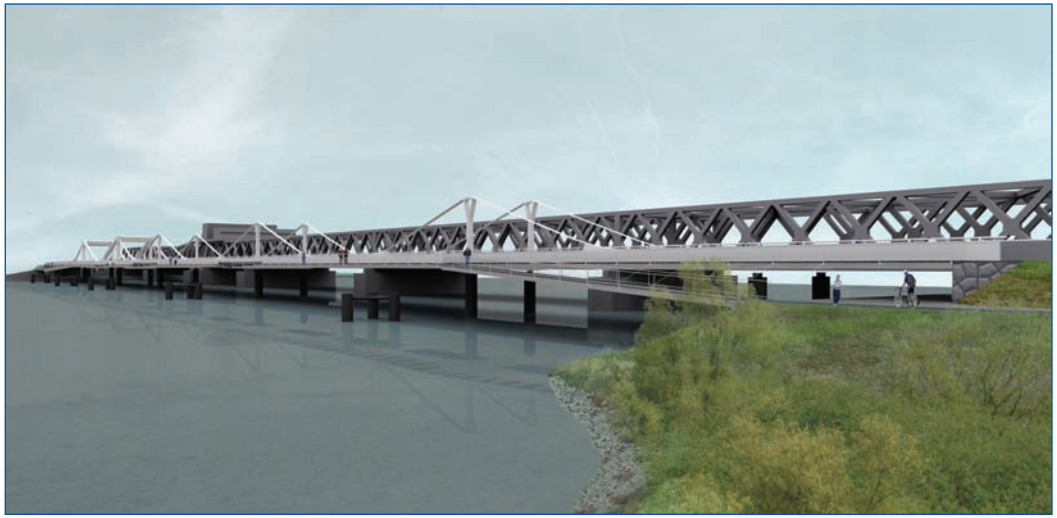
Ney and Partners is a structural engineering consultancy, established in Brussels. Since its foundation in 1997, the office has worked with an active view on the art of engineering through the integration of the different civil works disciplines. This integration and optimisation of structural elements aims to overcome the classic hierarchic assembly of constructive solutions. Innovative passerelles, bridges, roof structures and works of art developed by our office, express most clearly this vision.

In our collaborations with architects, engineers or artists we aim at a full integration of architecture, structure and context.

The construction project quality lies in the synthesis of specific design constraints. The structural aspect is of primary importance to this synthesis. From the very beginning of the design process, Ney & Partners conducts a constant research for advanced engineering integration. In doing so, our position as Engineering Consultancy overcomes the standardized dimensioning of predefined technical solutions.

An intense collaboration with the design team from an early stage on allows the development of innovative solutions, adapted to the context of the project.

Ney and Partners currently employs more than 40 civil engineers, architects, draughtsman, etc..



Short Description

Second bridge over the river Scheldt

Monumental, massive and industrial: these words apply to the first bridge connecting Temse and Bornem (Belgium). It is a heavy steel grey structure originally designed by Eiffel and later reconstruct in the year 1950 after having been subject to heavy damage during World War II.
Right next to this old one, a second bridge will be built.
The pile foundations of the new bridge will be next to the existing foundations. The new bridge has a length of 374 m and consists of seven fixed stayed spans varying from 18 m to 74 m and two 28 m long mobile spans. Because of the elegantly detailed finish, the atypical moulds for the abutments and the subtle lighting scheme, the bridge will blend into its environment and contrast beautifully with its neighbour.

Project Information

Owner: Waterwegen en Zeekanaal - Afdeling Zeeschelde
Architect: Ney and Partners
General Contractor: THV Tweede Scheldebrug
Engineering Office: Ney and Partners

Construction Start: 01/01/2007
Construction End: 30/05/2009
Location: Temse, Belgium

The “Tweede Scheldebrug” (Second bridge over the river Scheldt) is located in Temse, to the south of Antwerp. This bridge is the result of a Design and Build procedure that Ney and Partners have won in 2006 for the THV Tweede Scheldebrug, a joint venture of Cordeel (concrete works), Hye (foundations), Aelterman (steel) and Fabricom-GTI (electro-mechanics).

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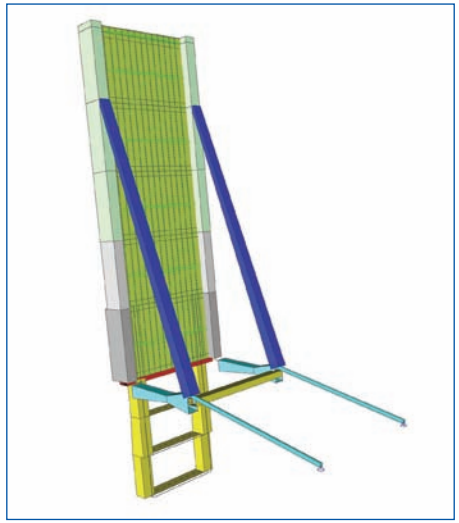
The 8.4 m wide vehicular concrete deck consists of a 30 to 40 cm light weight semi precast concrete slab that comprises polystyrene void formers within its depth. This slab spans between two steel girders whose upper flange doubles up as a stay that is attached to 6,7 m tall masts for the fixed spans. In the 28 m span mobile part, a light steel orthotropic steel deck spans between a series of secondary beams onto the two main girders. The suspension cables unload the box girders, and allow for an extremely open structure.

On the upstream side of the cross-section next to the vehicular deck is situated a 1 m wide maintenance path; on the downstream side a timber clad deck for the pedestrians and cyclists that has a varying width of 4,5 m to 6 m, bordered by a light stainless steel railing. Both maintenance and pedestrian and cyclist paths are carried by fins cantilevering from the longitudinal steel box girders. These girders form a physical barrier between vehicular and soft traffic.



Used software: Scia Engineer

“Tweede Scheldebrug” - Second bridge over the river Scheldt

The mobile bridge has one span of 56 m consisting of 2 opening parts of 28 m allowing for the passage of large ships. When closed the hydraulic jack functions as a suspension cable. A pair of masts is situated at the hinging point of the mobile section. Each of these masts is connected to the mobile section through a fixed-length stay and to the fixed bridge section by a variable length 0.56 m diameter piston stay. The fixed-length stay forms a non deformable triangle with the mast and the mobile section. The mast is used as a lever to tilt the bridge open or closed. The piston stay powers the opening and closing mechanism and forms a deformable triangle with the mast and the static section. In order to keep the piston force as small as possible (for operating and maintenance costs), a first large top counter weight is placed running between the mobile mast heads and a second smaller bottom counterweight under the bridge deck.

Temse bridge will be opened to the public in 2009. This piston stayed bascule bridge with its slender elements does not dominate but complements the existing monumental 1950’s truss girder bridge. The engineering ingenuity of the design lies in total integration of the kinematics into its structure.

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At Ney and Partners’, we have been using Scia Engineer for global as well as local models.

The steel box girders were designed according to the Eurocode 3 for steel structure on basis of the internal forces computed in the Scia Engineer model. The model consists of linear 2D beam elements. We have used numerical elements with a connecting node each 4 meters approximately. As the geometrical characteristics vary with the thickness of the plate, we would have to define manually more than 100 elements and their cross-section. Therefore we used the XML functionality to automatically create the cross-section, the nodes and the 2D elements in Scia Engineer. The traffic loads, of which the position moves along the bridge, were also created using the XML functionality. It allowed a quick link between a list in MS Excel and Scia Engineer. The internal forces (Nsd, Vsd, Msd) as well as the deflection were computed with Scia Engineer and used for the final design calculations. As the bridge is not symmetriccally by nature, two models were needed; this could have been time-consuming without the automatic creation via XML.

Other models were used for other necessary calculations such as: assessment of the 3D behaviour of the mobile bridge, assessment of the 3D behaviour of the static span, design of the concrete slab, and other detailed calculations of specific parts of the structure.