

Ney & Partners

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Nomination

NEY
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Ney & 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 optimization of structural elements aims to overcome the classic hierarchic assembly of constructive solutions. Innovative bridges, roof structures and works of art developed by our office, express most clearly this vision.

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.

Ney & Partners currently employs more than 45 civil engineers, architects, draughtsman, etc...



Software: Scia Engineer

Dredging Bridge A.M.O.R.A.S - Antwerp, Belgium

Architectural project and study of stability.

Context

The project of A.M.O.R.A.S (from "Antwerpse Mechanische Ontwatering, Recyclage en Applicatie van Slib" which means "Antwerp company of mechanical drainage, recycling and application of silt") consist in the installation of a silt treatment system. The silt is dredged from the Antwerp port and basins and processed in a dewatering facility. The dried residues contained in the filters are stored and will be recycled as construction materials.

The site is located along the A12 highway in the industrial area north of Antwerp.

The mission of the engineering study of the bridge structure was entrusted to Ney & Partners by the THV SeReAnt, a joint venture between Jan de Nul - Envisan - Dredging International - DEC.

Process description

The silt dewatering occurs in a 350 m diameter basin. The basin is itself divided in 4 smaller sedimentation zones. A movable structure rotates around the centre of the basin. Two pumps are suspended on the structure and are constantly moving across the 173.5 m span to pump the silt towards the dewatering plant.

Project description

The dredging bridge ("baggerportiek") consists of a 173.5 m span steel structure. The design of Ney&Partners is a bowstring bridge with two inclined arches connected by horizontal steel plates. Bowstring bridges are the most cost-effective structures for such a span and there was therefore no difficulty to convince our client to abandon their first design which consisted of a heavy truss-beam of constant height, without any added architectural value.

The arches, made of 800 mm diameter steel tubes, are inclined and join in the middle of the span. The bridge deck consists of 4 HEM-beams on which the pumps are rolling. The HEM-beams are also used as tension element of the bowstring structure. The hangers are 36 mm steel tension rods.

The total weight of the structure is 200 tons. The loads acting on the structure are the structure's self-weight and additional permanent loads, thermal and wind loading and the weight from the independently moving pumps.

Assembly

The steel contractor Sleurs, from Balen, was responsible for the construction and assembly. Pieces of the bridge deck were prefabricated in Sleurs' workshop and then brought on site where they were placed on temporary supports to achieve a perfect positioning according to the calculated precamber. After that the HEM-beams have been connected with full penetration welds. The arch was also prefabricated in 5 pieces and bolted on site. The assembly of the arches was achieved in two days.

Use of Scia Engineer

Scia Engineer has been used for a full 3D model of the "bridge". The model is made of 3D beam elements. The following modules of Scia Engineer have been used: static linear calculations, stability calculations, dynamic calculations, 2nd order geometric non-linear calculations, tension only non-linearity.

The bridge deck is quite flexible and therefore, when the pumps are moving along the bridge, cable decompression can occur. For this reason, the entire structure has been checked with the function "tension only" non-linearity.

Moreover the arches are very slender. The buckling verification was achieved using the internal forces out of a second order analysis starting from the appropriate buckling shape out of the stability calculation. As the pumps are moving along the bridge span and the bridge itself is rotating, a verification of the eigen-frequencies and modes has been done.

Dredging Bridge A.M.O.R.A.S

Antwerp, Belgium

Project information

Owner	SEREANT
Architect	Ney & Partners
General Contractor	Sleurs
Engineering Office	Ney & Partners
Construction Period	From January 2010 to December 2010
Location	Antwerp, Belgium



Short project description

The project is about the dredging bridge of A.M.O.R.A.S ("Antwerpse Mechanische Ontwatering, Recyclage en Applicatie van Slib" which means "Antwerp company of mechanical drainage, recycling and application of silt") and consists in the installation of a silt treatment system. The dredging bridge consists of a 173.5 m span steel bowstring bridge. The structure rotates around the sedimentation basin while two pumps send the silt to the dewatering plant. Ney and Partners achieved to propose an elegant, cost-effective design within a heavy industrial environment.

