Ingenieursbureau Stendess N.V.

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Ingenieursbureau Stendess N.V., a steel and concrete engineering company

The engineering firm Stendess was founded by an experienced team specialising in the study and design of steel constructions. From its establishment Stendess has made high quality and full service provision its top priority. Thanks to this integral service, where 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.

Stendess can follow up on cross-border projects in accordance with most standards and codes: Eurocode, NBN, NEN, DIN, NF, AISC, British Standards and specific national codes.

Key activities

- Industrial buildings: steel factories, power plants, depots, etc,
- Other buildings: service buildings, concert halls, sport facilities, swimming pools, apartment buildings,
- Bridge constructions: arch bridges, cable –stayed bridges, suspension bridges, bascule bridges, swing bridges, orthotropic bridges, mixed steel-concrete bridges…
- Off-shore projects: lock gates, Roro, oil rigs…
- Industrial equipment: silos, cranes, crane ways, storage tanks…
- Erection engineering: longitudinal and transverse repositioning, skidding, lifting, bridge launching…

Locations of the constructions: Belgium, the Netherlands, France, Germany, United Kingdom, Spain, Sweden, Saudi Arabia, Greece, Singapore, Chile, Brazil, Cameroun, Russia, Thailand…

Short Description

Bowstring bridge with deck for cars and pedestrians

The specified bridge crosses a fluvial stopping place of boats situated at Béthune. It is a prolongation of a pedestrian path to a dead arm of the canal Aire which serves as a docking station for boats and it leads to a regional road.
The construction consists of two main beams (box beams) which have spans of 23.04 m, 92 m and again 23.04 m. Between these two beams transverse elements are placed. Most of the weight of the bridge is held up by the suspension cables. On top of the main structural steel construction, premade concrete slabs are positioned to form the actual driving lanes. The calculations included the control of the bridge under service conditions as well as a calculated proposal of the different construction phases. Calculations were made according to EC 3 with special requirements in compliance with the French codes.

Project Information

Owner: Département du Pas de Calais, Direction des infrastructures et des transports
Architect: Direction des Infrastructures et des Transport, Service des ouvrages d'art
General Contractor: Aelterman Bvba and DG Construction

Engineering Office: Ingenieursbureau Stendess N.V.
Construction Start: 2007
Construction End: 2008
Location: Béthune, France

- Type: Bowstring bridge with concrete deck for cars and cyclist/pedestrian traffic
- Location: Béthune (Northern France)
- Total steel weight: +/-950 tons
- Total length: 23.04 m – 92 m – 23.04 m
- Width of concrete slab: 11.5 m
- Exploitation: 2 rows + multifunctional area's

About the project

The specified bridge has as goal to crossover a fluvial stopping place of boats situated at Béthune. (following the deviation RD 937)
The bridge overtakes a pedestrian path (situated in the park of Loisne), a dead arm of the canal Aire which serves as a docking station for boats and a regional road.

The construction consists of two main beams (box beams) which have spans of 23.04 m (Land head-pylo n), 92m (pylon-pylon) and again 23.04 m (pylon-land head).

Between these two beams transverse elements are placed, which are standard I-rolled sections, except for the box beams at the pylon support.
Most of the weight of the bridge is held up by the suspension cables (made of Z-strings) which connect the main longitudinal beams and the arches. These arches guarantee the stability of the bridge sollicitated by permanent as well as traffic loads.

On top of the main structural steel construction, premade concrete slabs are connected onto the transverse beams to form the actual driving lanes. The calculations included the control of the bridge under service conditions as well as a calculated proposal of the different construction phases. Calculations were made according to EC 3 with special requirements in compliance with the French codes.

Use of ESA-Prima Win

Description of the technical questions to be solved with ESA-Prima Win

Both, for the dimensioning of the bridge under traffic situation as well as the erection engineering of the bridge, ESA-Prima Win was used.

From a technical point of view the engineering part of this project had several challenges

First of all the implementation of the different solicitation models was done according to the French code in an efficient and modular way.

Used software: ESA-Prima Win

Bowstring bridge with deck for cars and pedestrians

Secondly, thanks to the module absences, the different collision scenarios could be checked whereby each time one suspension cable was taken out of consideration.

Even by the very start of the project the graphical sections module proved to be very useful for dimensioning the box beams of the arches and the main beams.

During the process of the construction engineering it was possible to model temporary structures and loading conditions. For example the hydraulic uplifting of the main beams was calibrated to be able to close the assembly-joints.

Further on due to the importance of the arch in the total bridge design a second order check of this element was performed with the non-linear second order settings.

Off course we must not forget once the different combinations were put in, a steel code check of the profiles could easily be made!

Used modules

- Norm control CM66
- Linear static 3D
- Tension members
- Only pressure support point
- Non linear test
- 2nd order calculation (arch)
- Graphical section
- Language: French