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 of Bamberg, Germany

The city of Bamberg in Germany wanted to replace the old "Luitpoldbrücke" across the Main-Danube-Canal. This bridge is an important access to city centre. The old bridge has been removed and replaced by a "3-feld bridge" existing of 2 concrete approach spans (±10.5 m) and a steel midspan of 80 m.
The arches are build up with 3D-braced arches composed of arched tubes (Ø 406, 4). The bridge deck is hung up at the arches by a radially placed hanger (Ø 100).
The construction consists of two main beams connected by I-shaped, in height changing, cross members. The mean beams consist of two above each other placed tubes (Ø 406, 4) connected with a central vertical plate. The node that connects the arches with the last cross member and the main beams is realized with cast steel in the form of a snail's shell.

Project Information

Owner: City of Bamberg, Germany
Architect: Rieger + Brandt Planungsgesellschaft im Bauwesen
General Contractor: Max Bögl Stahl-und Anlagenbau & Co KG

Engineering Office: Ingenieursbureau Stendess N.V.
Construction Start: 2006
Construction End: 2006
Location: Bamberg, Germany

- Total steel weight: ± 735 tons
- Total length: 10.5 m – 80 m – 10.64 m Width: 19 m

About the project

The city of Bamberg in Germany wanted to rebuild the "Luitpoldbrücke" over the Main-Danube-Canal. This bridge is the access to city centre. The old bridge is removed and replaced by a "3-feld bridge" existing of 2 concrete approach spans (±10.5 m) and a midspan of steel 80 m. The arches are build up with 3D-braced arches composed of arched tubes (Ø 406, 4). The bridge deck is hung up at the arches by a radially placed hanger (Ø 100).

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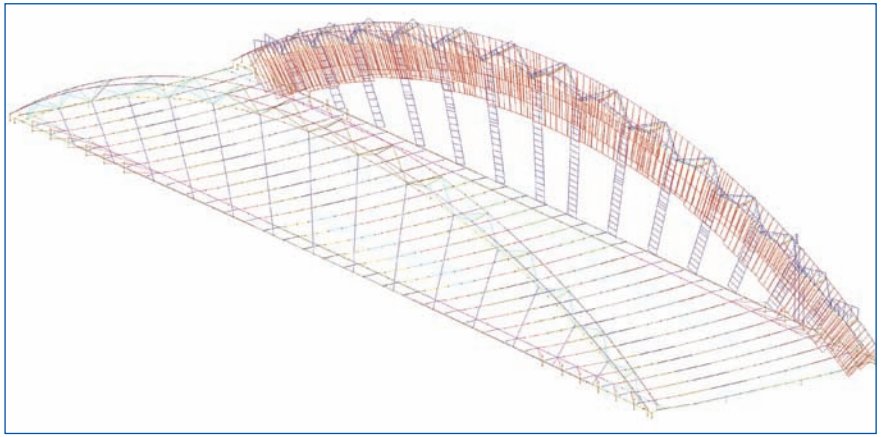
The node that connects the arches with the last cross member and the main beams is realized with cast steel in the form of a snail's shell.
For the erection by launching the piles of the old bridge are used and demolished afterwards.

Use of ESA-Prima Win

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

Both, for the camber and deformation calculation and the erection engineering of the bridge, ESA-Prima Win was used.
The complete 3D-model was put with bars and different building stages were set.
For the calculation in erection situation each bridge member was given a buckling factor based on the rules of EC3. The beam check was then made by EC3 Steel Check of ESA-Prima Win.
The buckling control of the arches was done in three ways. The first method was done with EC3-Steel Check of ESA-Prima Win. The second method was based on the calculation of the axial critical buckling force, which was compared by ESA-Prima Win with



Used software: ESA-Prima Win

the max. calculated axial force. The third method was done by using the stability check of ESA-Prima Win in which a sinusoidal pre-deformation was given for the arches.
Because the linear calculation resulted in compression in the tension bars between arch and deck, a non-linear calculation was needed.
In the calculation of this project the use of ESA-Prima Win was very intense and diverse:

- Non-linear calculation
- Stability control
- Building stages

Description of how our experience with ESA-Prima Win proved its completeness

- Dimensioning a 3D structure.
- The possibility of using and combining the results of ESA-Prima Win in a flexible way.
- The possibility of calculating graphical sections.
- The possibility of using tension only elements for the modelling of the cables.
- Stability calculation and second order calculations.

This project proves the great diversity of ESA-Prima Win in checking the structure and the use of materials.

Used modules

- Base
- 3D frame
- Dynamics
- Steel code check (DIN)
- Stability
- Physical non linear conditions