



Strukton
Immersion Projects

Strukton Immersion projects



Transport and installation of 2 bridge caissons

1915 Çanakkale suspension bridge – Turkey

Project information

Client:	DLSY JV - Daelim, Limak Holding, SK E&C, Yapi Merkezi
Duration:	1,5 year
Date of completion:	June 2019
Contract value (EUR):	€ 9.588.862,-

Description of the activities

Design and operations for the float up, temporary mooring, transportation and installation of two caissons forming the foundation of the bridge. The works included an installation spread using two tugs on anchor and two DP vessels, a custom made, remote controlled, (de-)ballasting system and an inventive positioning system on the sea bottom.

Details

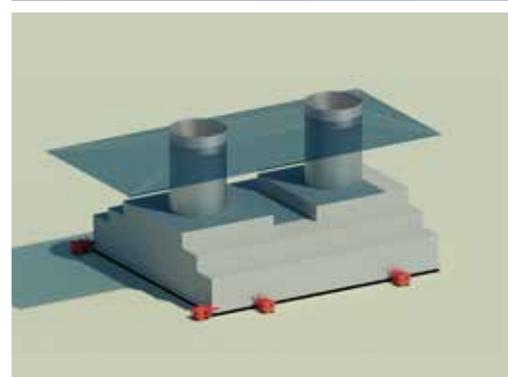
Type:	Caissons for bridge foundation
Total amount of caissons:	2
Caisson measurements:	Concrete box (LxBxH) = 83,3 x 74 x 16/21m Steel shafts (DxH) = 18 x 23/26m
Water depth:	37/45 m
Weight:	66.000 ton (floating)
Foundation:	Gravel bed
Transport distance:	2,6 nmi

Placing tolerances:

- Horizontal tolerance x and y: +/- 200 mm at the centre of both shafts

Limiting design conditions for installation:

- Wave height (Hs) ≤ 1,75 m
- Wind speed ≤ 17,9 m/s
- Current velocity ≤ 1,25 m/s



Specific information

The 1915 Çanakkale Bridge connects the Lapseki District to the Gelibolu District. The 3,6 km long suspension bridge is built over the Dardanelles Strait in the Çanakkale province of Turkey. For the foundation of the bridge pillars two caissons were installed.

The first part of the caissons was built in a dry dock. The caissons were floated while flooding the dock and transported to the mooring location just outside the dock. In the wet dock the second part of the caissons was built including the shafts on top. By slackening the mooring wires, the increasing draft of the caissons could be followed.

The installation of the caissons was done during a 60 hour operation. Within this time 66.000 m³ of water had to be pumped into the caissons. To secure floating stability, 29 compartments were created which could be filled separately. Ballasting was done using a tailor made pumping system on a DP vessel. The water was pumped to the caisson through floating pipe lines connected to a manifold inside the shafts of the caissons. In the manifold the water was directed

to the compartments. The whole operation was remote controlled from the command unit on the ballast vessel. In case of data or power failure the valves in the manifold automatically closed. A de-ballast pump in the manifold container could be used in order to re-float the caisson if necessary.

Four tugs ensured the horizontal position of the caissons during installation. The two northern tugs were connected to pre-laid seabed anchors. DP vessels were chosen on the south side because of the presence of many cables south of the installation location. A special guiding system was designed to achieve the very tight position tolerances at a depth of 45 meter and in current flows up to 1,25 m/s.

On the sea bottom four steel pipes with guiding frames were placed and at the floor level of the caissons jacks were positioned. One meter above final position the jacks were pushed out against the guiding frames. The guiding system ensured that both caissons were ultimately positioned within 10 mm of the target position.