

Paper title: "Innovative Positioning System Integration for Immersed Tunnel Construction"

In the southeastern part of South Korea 18 prefabricated tunnel elements have recently been immersed on the seabed as a part of a major road construction project.

This 3.2 km long tunnel has a maximum depth of 48m. The operational conditions were extraordinary as the immersion location is in direct connection with the Pacific Ocean and swell waves of over 8 meters combined with strong currents were no exception. Just 50 mm deviation was allowed.

Both the length and depth of this immersed tunnel imposed great challenges and required 'out of the box' positioning solutions. Since the contract was awarded in March 2007 and the first immersion was scheduled for January 2008 the development and implementation time were very short.

The traditional deck mounted towers holding survey prisms were scratched from the drawings and replaced by a variety of new sensors. For starters, dGPS was used during the transport of the elements. During the immersion, a custom made 'light tautwire' provided accurate position information, backed up by an SSBL system. Both systems used a gyrocompass for heading determination. Four mechanical stroke length sensors provided sub millimeter precision in the last and critical stage of the immersion process when the element was aligned with its predecessor. Finally, tacheometric measurements through the tunnel determined its final position.

All these new sensors -as well as remote controlled winches, CCTV and ballast water systems- required for the existing software to be re-written. Strukton's in-house software engineers managed to successfully deliver this new software prior to the first immersion. Already during the first immersion the new soft- and hardware exceeded the expectations when compared with the conventional system.

The project finished in 2010 after the successful immersion of the last tunnel element in June and the opening of the tunnel in December by the Korean president.

Corresponding author /

intended presenter:

Geocon bv

B. Ruesink

Postbus 1025

3600BA Maarssen

+316 5245 8262

bart-jan.ruesink@strukton.com

