



## Innovative solutions in immersed tunnelling

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### Summary

Through the years various immersed tunnels have been constructed using a relatively traditional technique. Although this is a traditional technique, the Mergor engineers focus on the optimisation of the existing techniques as well as on the demand for ingenious designs to meet the needs of specific local conditions.

On recent projects a new type of modular bulkhead and closure joint were introduced. The immersion of an element under an existing monumental building is defined and the immersion of a tunnel element in a tight tidal window influenced by comparatively large tidal differences is explained. Besides these topics a short introduction of the recent projects is given.

**Keywords:** Immersion, innovation, bulkhead, closure joint, freezing, primary support, secondary support, support pin.

### 1. Introduction

Since the year 1910 (the Detroit River), various immersed tunnels have been constructed throughout the world. In spite of the fact that immersed tunnelling is not based on a high tech construction method, immersed tunnelling can still be innovative and, wherever there is water to be crossed, it will present a feasible alternative to other tunnelling methods.

Although immersed tunnelling is a relatively traditional technique, all the different types of immersed tunnel projects require specific solutions. Through working on these various projects, these specific solutions lead to alternative results. These situations can even lead to a new design philosophy and a new working method: in other words, an innovative solution. This paper will focus on the optimisation of the existing techniques as well as the demand for ingenious designs to meet the needs of specific local conditions.

### 2. OTAO<sup>®</sup>

The immersion process and the innovative features of the tunnels that are described below are all currently under construction by Mergor Underwater Construction. Mergor is a specialist subsidiary of Strukton Betonbouw bv and is specialised in underwater construction, especially immersed tunnel techniques. The main scope of Mergor's work consists of one of the most remarkable parts of immersed tunnel construction: the floating, transport and immersion of tunnel segments. In the Netherlands this process is well known as the OTAO<sup>®</sup> process. OTAO<sup>®</sup> is the Dutch abbreviation