Smet Group

Project tunnel borings with tubings Rysum (D) – Borgsweer (NL) Emstunnel

Client: Gasunie NL
Main contractor: BCE / AET
Machine: TBM
Technique: tunnel with segmental lining
ID-OD: 3.000-3.500 mm
Lengte: 4.016 m
Uitvoering: 2009

The design and construction of the hydroshield tunnel boring machine by Smet is part of the construction of a new gas-pipeline from Germany to the Netherlands underneath the river Ems near Rysum. The river Ems rises near Bielefeld (Teutobruger Wald) in Germany and flows through the Dollard and the Wadden Sea into the North Sea in the north of the Netherlands. For information, the river Ems is 371 km long, of which 238 km navigable.

The client 'Gasunie Nederland' granted the order to the BAM Combination Emstunnel (BCE) for a contract sum of approximately 47 million €. For the Tunnelling works, BCE decided to integrate Smet-Tunnelling nv into the Joint Venture. This new Joint Venture was called 'Arbeitsgemeinschaft Emstunnel' (AET), a joint venture of three companies, namely BAM, W&F AG and Smet-Tunnelling nv.

A tunnel of 4.016 m length with an internal diameter of only 3 m had to be built. In order to transport gas at a pressure of just below 80 bar, a steel pipeline of 1,2 m diameter (DN1200) was to be used. Even though a pipe wall thickness of 22,7 mm was applied inside the tunnel, it still needed to be protected against accidental damages and corrosion. For this purpose, an additional 7 mm of polypropylene coating was applied on the pipeline. Four pipe strings, each with an approximate length of 1 km, were assembled and tested on site in the northern extension of the tunnel. After tunnell completion, it was to be installed inside the tunnel. Once this was accomplished, the remaining space inside the tunnel had to be filled up (tunnel back fill) in order to make it a permanent and water tight structure.

The geology along the tunnel axis was subject of a very thorough soil investigation. All kinds of soil layers were encountered, from the typical Dutch soft soil layers (Wadzand and peat) to the firm clay sediments (Lauenburger Ton) and the highly compacted Pleistocene Sand.

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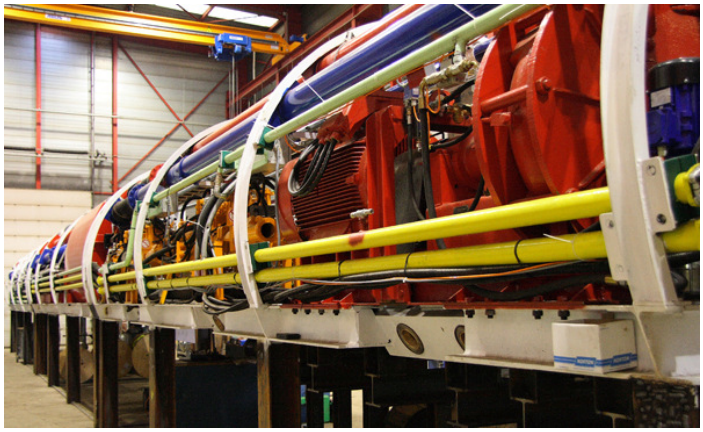
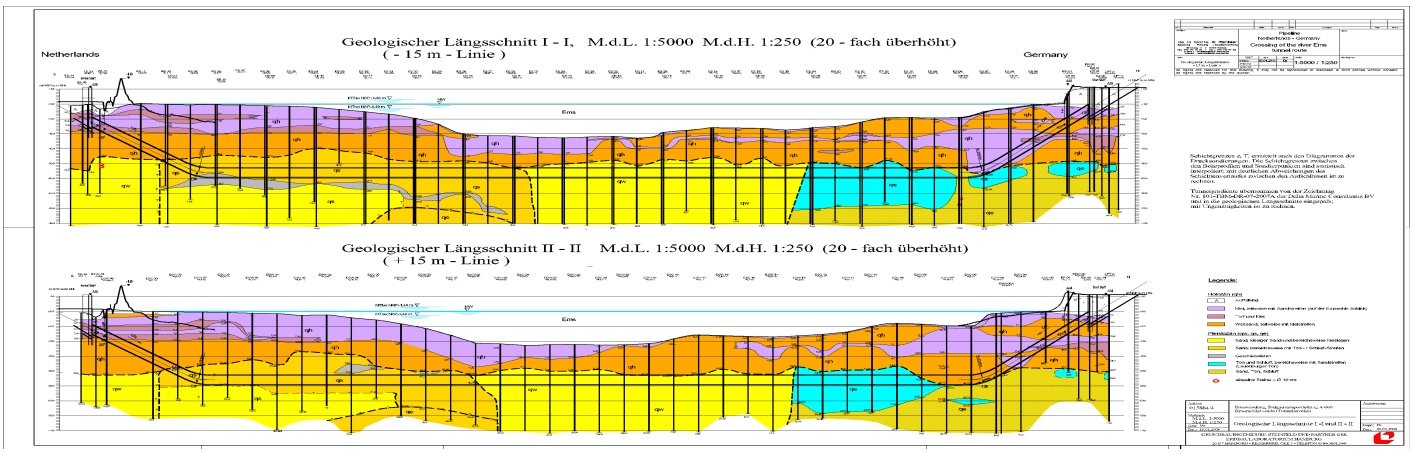
A hydro shield tunnel boring machine (TBM) equipped for segmental lining was used to excavate the tunnel. The outside diameter of the machine was approximately 3,5 m with a length of 16 m. Together with it's 7 trailers comprising the machine's auxiliary units, the total length is an impressive 80 m. The cutter head that was used to loosen the soil and to crush obstacles had been specially adapted to the geology of this project. The machine was named 'Amisia' after the latin name for the river Ems.

The northern portal of the tunnel was located on the German bank of the Ems in the immediate vicinity of the Emden Vessel Traffic Service – Knock Radar. All site installations served the sole purpose to house and supply the tunnel boring machine with energy, air and segments during the execution of the works. The excavated soil is hydraulically pumped removed from the tunnel and processed on site by the separation plant. The TBM itself started it's drive from a sheet pile shaft in the center of the site and arrived at Borgsweer in a similar construction.

The tunnel excavation began in spring 2009. The three tunnelling crews, with joined forces from both Wayss & Freytag and Smet-Tunnelling people, worked on a 24 hours a day/7 days a week schedule. As a result of a good team spirit and an excellent performance the TBM noted a very high progress rate.

In early summer 2010 the work was due to start on inserting the gas pipeline so that gas could be carried through the pipe line in October 2010.





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