



Bridge over the motorway A27, steel truss with a FRP deck

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Abstract

In the Netherlands a bridge is built crossing the motorway A27 near Utrecht. This bridge was constructed as a combination of steel and FRP, with a total length of 140 meters. The bridge is made of a steel truss girder and a deck of FRP (composite). The connection of the composite deck to the steel truss girder was a challenging part. To solve this problem two load-paths are introduced. The first is made with an adhesive compound, the second with a pin-hole connection. Also the location of the bridge with the foundation inside a polder construction with highly compressible soil was a challenge to solve. The use of a jet grouting was necessary to solve this problem.

Keywords: Composite, FRP (Fiber reinforced polymer), steel, bridge, hybrid, jet grouting

1 Introduction

Composite (FRP) material has been used for many years in the aircraft construction and in wind turbines. For several years is composite an up and coming material in civil engineering in the Netherlands. In structures such as bridges and locks the composite material is an alternative material use beside the existing materials such as steel, concrete and wood. In the Netherlands in the last few years several large projects have been built with composite material. In this article the bridge over the A27 near Utrecht (installed in 2012) is described.

2 Project: bridge over the A27

Over the A27 motorway lay two railroad bridges, one railway bridge is currently being used as a

road bridge. The bridges were built in 1982 and are already foreseen for future track doubling. Due to the track doubling between Houten and Utrecht Central Station in 2014 from two to four tracks, the bridge used by road traffic will be converted back to a bridge for rail traffic. The current road bridge is a main bicycle route between Utrecht and Houten and serves local traffic in both directions. To maintain the connection for local automotive and bicycle traffic a new bridge is being commissioned by the rail infrastructure owner ProRail and the ownership will be transferred to its new owner Rijkswaterstaat (department of public works, part of ministry transport and environment).

2.1 Sensitive ground

The A27 motorway near Utrecht is located in a low lying landscaped. With a so-called artificial