

Development & Testing of New FRP Bridge Deck to UK standards



Overview

The development of a resin infused FRP bridge deck and its testing to the UK Bridge Design Guide standard, BD90/05.

Details

Location	Breukelen, Netherlands and University of Bristol, UK
Description	Development of a resin infused FRP bridge deck and testing to BD90/05 (UK Bridge Design Guide).
Client	Network Rail
Date of project	2014
Where FRP composites are used and why	During development of a solution for the replacement of an existing steel and timber farm accommodation bridge, the options report recommended an FRP deck due to initial cost and whole life cost being significantly more favourable than other materials considered. After significant research into a number of different FRP deck types, it was decided to develop a new deck and test to UK standards.
Specific design details	The three samples measured 2700mm long, 500mm wide and 212mm deep. These were each placed into a test rig at University of Bristol where 10million fatigue cycles were applied on each test panel, and the fatigue loads varied sinusoid-ally from a minimum of 4.5kN to a maximum of 45kN at a maximum frequency of 4Hz. Each fatigue test was stopped at intervals of approximately 1 million cycles to identify and record the location, severity and extent of any visual damage to the GFRP deck panels. On completion of each fatigue test a static test was undertaken to failure.
Type of composite used	The three deck samples were fabricated by vacuum resin infusion using Ashland Derakane Momentum epoxy vinyl ester resin and Maxguard Gel Coat with foam core and glass fibre reinforcement. An anti-slip surfacing material was also applied to the samples so that as well as testing the fatigue of the FRP, the durability of the proposed surfacing could also be tested.
Performance in service	Each of the three samples performed well with no evidence of fatigue shown throughout the testing. The destructive testing results were also far in excess of design requirements and in two samples resisted the maximum load that could be applied by the testing rig.
Project partners	Principal Contractor - J Murphy and Sons Limited FRP Designer and Fabricator - Delft Infra Composites Lead Design Partner - Jacobs Testing Facility - University of Bristol

Contact