



1 Bio-based composite moveable bridge

Wouter Claassen

Witteveen+Bos, Deventer, The Netherlands

Contact: wouter.claassen@witteveenbos.com

Abstract

This paper describes the methodological process for designing a 17 metre span, moveable bio-based bridge in Ritsumalsyl in the Netherlands. The bridge consists of 100% natural fibres and a bio-based resin. At the time of writing we are still engaged in design stages and it is likely that the design will continue to evolve as we learn more through the project.

Keywords: bio-based, natural, moveable, bridge, composite, natural fibres, resin, innovative, green composites, sustainable, durable, Witteveen+Bos.

2 Introduction

Witteveen+Bos is working on behalf of the Fryslân province on the design of a 17 metre span, bio-based composite moveable bridge for cyclists. The Ritsumasyl bridge, located in the Netherlands, will cross the van Harinxma canal. This bridge will be the largest moveable bridge in the world to be designed in this way. We are working with universities, research institutes and suppliers to test and design the components and materials for the structure. With this concept we want to set a new benchmark for a more sustainable built environment delivered through civil engineering. Some of the problems we have to overcome include what kinds of fibres to use, which resin is bio-based; what is the effect of micro-organisms in the fibres; how strong will the bridge be over its lifetime; and how materials can be re-used. Rather than an experiment, this is a real project being developed for a client who is willing to accept the challenges and associated risks. In the first phase, we sought existing bio-based fibre products that we could use in this civil environment. Following this, we combined our, and our suppliers' knowledge in order to create new materials that would satisfy our goals. Because the bridge is

moveable we have to combine standard mechanical moving components with bio-based material.

3 The design process

At the start of the project our ambition was to design a bridge made entirely from green composites. During the process we have had to adjust our ambition to 100% natural fibres and a bio-based resin. Our ultimate aim is to have created a green composite product that will be a feature of many more bridges to come. 100% green composite bridges are not new but none have so far met our design standards. Figure 1 shows a 100% living bridge used by pedestrians in India.