Bridges using an innovative wood-concrete-composite system for applications under dynamic loads

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Summary

After the wood-concrete construction-method was established as an independent branch within the slab-construction division it is now increasingly being used for more demanding constructions. For instance: long span, highly strained floors in industrial and official buildings with advanced requirements towards sound-protection, vibration behaviour and fire protection. Floors, ceilings or walls in residential buildings with demands in prefabrication and swift building-succession. Bridges designed for pedestrians or road-traffic. In this paper a pedestrian bridge, that was finished in summer 2006 in Kayl / Luxembourg, is being displayed. It represents the first bridge in wood-concrete-composite construction worldwide using glued in steel meshes (called HBV-Shear Connectors) as connective members.

Keywords: wood-concrete-composite, glued in shear connectors, bridges, concrete bearings, bending test, cyclic loading test, long term performance

1. Introduction

After years of research and development wood concrete composite constructions constitudeconvincing alternatives for conventional applications in the timber construction domain. This includes bridge design as well. The advantages of timber construction design are linked with the advantages of wood-concrete-composite constructions referring to bearing capacity, serviceability and the concept for wood-protection. However two general possibilites exist for applications of wood-concrete-composite bridges; the solution as platebridge as well the approach as beambridge. The concrete plate on top is deployed as driveway. Simultaneously it is being used for carrying on the load by composite action – via rigid shear connectors – to the wooden section. A distribution of the shear force can easily be established within the concrete slab. Ultimately the concrete slab protects the timber cross section against direct weathering. Thus it takes on several functions simultaniously. The timber on its part adds an aesthetical touch, a natural atmosphere, an appealing optic and staticial strength. By positioning the wooden cross section in the tension-zone the timercross section attracts a considerable part of the occuring tensional stresses. They can be reduced by reeinforcement within the concrete slab. As a whole the deformations, the sensitivity for vibration and the system-heigth are reduced through the composite function.

https://doi.org/10.2749/weimar.2007.0392