Timber-granite-composite structures for pedestrian and cycle path bridges

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Abstract

This paper presents intermediate results of a cooperative research team on feasible shear-connections for timber-granite-composite structures for pedestrian and cycle path bridges. At the beginning, feasible shear-connector concepts are presented, which are analysed in a first shear test series with regard to load-bearing capacity, stiffness, fracture behaviour, and also manufacturability and economic efficiency. Based on the shear tests, a connector is finally selected which can be used in timber-granite-composite structures and will be further investigated in the progressing research project.

Keywords: timber-granite-composite, composite structures, natural stone, granite, timber, pedestrian bridge, sustainable, shear-connector, shear test series, perforated plate.

1 Introduction

The use of timber and granite as natural materials for pedestrian and cycle path bridges can bring these bridges to a new ecological and sustainable level. The advantages of both natural materials can be used best in a composite structure.

Timber has a low self-weight, a high tensile strength, a positive CO_2-balance [1] and is resistant to de-icing salt. On the other hand, granite has a very high compressive strength ($f_{c,m}$≈185 N/mm²), is also resistant to de-icing salt and weathering and does not shrink or creep. Therefore, a timber-granite composite bridge consists of a timber beam at the bottom in the tension area and granite slabs

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