



## Full-scale test on bonded steel-concrete composite beam

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### Abstract

This work studies the function of a full-scale steel-concrete composite beam assembled by collage under statistical load. This paper presents the analyse on failure mode of the composite beam, strain distributions in the longitudinal and the vertical directions, relation entre load and maximum deflection, uprising of the concrete slab from the steel beam and effort transfer between the steel and the concrete. The result shows that the failure of the bonded steel- concrete composite beam is not appeared in the adhesive layer or in the steel-concrete interface. The connection between the steel beam and the concrete is perfect.

**Key words:** *Composite beam, Steel, Concrete, Mechanical behaviour*

### 1. Introduction

The advantage of a steel-concrete composite beam is that the composite structure can combine high tensile strength of the steel and high compressive strength of the concrete. The connection between the steel beam and the concrete slab is currently ensured by shear metallic studs. The steel-concrete composite structure is widely used in civil engineering, in particular, in bridge construction. One of the most significant problems for the steel-concrete composite structures is shear strength in the steelconcrete interface. This problem is currently solved by the presence of shear stud connectors that ensure the connection between the steel girder and the concrete slab. These connectors are generally welded on the surface of the steel girder which can degrade the performance of the steel

and make the realization of the composite beams more complex.

The connection mode between the concrete slab and the steel girder is important for the durability and mechanical behaviour of the steel-concrete composite bridges. The use of a prefabricated concrete slab, instead of fresh concrete on the steel girder surface, shows particularly interesting. The replacement of metallic connection by bonded connection makes it possible. This type of the composite beam can decrease the appearance of shear stress concentration and to obtain continuous transfer of efforts between the concrete slab and the steel beam. This is due to the fact that for the bonded steel-concrete composite beam, the bonded surface of materials is uniform and much larger than that connected by welded shear stud. In this case, mechanic performance of the composite structure depends strongly on the steel