

Abstract

Title: Shear strength evaluation of extruded precasted prestress concrete beams with cast-in-place topping. Application to the covering of the LAV in Barcelona
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The structural solution for covering the road which runs parallel to the high-speed Madrid-Barcelona-French border railway, proposed by “Prefabricados Castelo”, corresponds to a solution of simply supported beam with composite section. The composite section is formed by a precast lower flange plus webs in prestressed concrete and a cast-in-place upper flange in reinforcement concrete, acting as compressive slab.

The behavior of the beam depends of the ability of the joint, between the precast beam and the cast-in-place compressive slab, to transmit the shear stresses. To ensure this, the manufacturer places a hook-shaped transverse reinforcement between the webs of the precast section. This connects both parts through a dovetail configuration. The objective is that the reinforcement contributes to resist the shear stress and to improve the shear strength of the beam. Due to the great importance of the transfer of shear stresses on the bearing capacity of the section, and because the proposed design cannot be supported by any code, the project manager decided to prove the safety of the composite beam by means of a series of shear and flexural strength tests.

The objective of the present Master Thesis is to propose a rational shear resistance mechanism for beams such as the proposed by “Prefabricados Castelo”, considering the shear test results. It is not intended to propose a new formulation to predict the shear strength of the concrete or transverse reinforcement, but to present a rational hypothesis, based on the results of the tests, in which the contribution of the hook-shaped transverse reinforcement can be considered to resist the shear force.