

EFFECT OF PRESTRESSED EMBOSSEMENTS UNDER VARIOUS TYPES OF LOADING USING FEM ANALYSIS

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ABSTRACT

Composite slabs of trapezoidal steel sheeting and concrete are widely used for ceiling structures in all types of buildings. Prestressed embossments can serve as a meaning to ensure the composite action without need of other load bearing reinforcement. Design of the composite slab according to valid codes is governed by semi-empirical methods using bending tests to obtain unique parameters for each type of sheeting. Smaller and less expensive shear slip-block tests are considered as a meaning to obtain shear characteristics of the sheeting, which could be used for design of the sheeting.

In our laboratory bending tests with different load arrangements and shear test were performed. The key role in load bearing capacity of the slab has the shear connection between steel sheeting and concrete.

The FE (Finite Element) modelling of the connection must deal with a complicated geometry of the embossments and several possible failure mechanisms. Three types of numerical models are being created using Atena software. 2D and 3D models of shear test serves to describe the failure mechanism of embossments. Bending model of one rib over the whole span serves to include effects curvature due to bending. Influence of elevated temperature on shear bearing capacity is observed as well. The models are being set, calibrated and compared regarding data from the experiments performed in our laboratory.

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