

- Research Grant in 2011, FCT/UNL
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## Strengthening of flat slabs with bonded concrete overlay



Hugo Fernandes

Válter Lúcio, PhD

António Ramos, PhD

## Objectives

Strengthening of concrete structures with a new concrete layer has been developed over the years for columns, beams and slabs. Flexural and punching strengthening of concrete flat slabs using the Bonded Concrete Overlay technique in the tensioned face poses several challenges to control cracking and ultimate limit states.

Current design models only consider application on the compressive side of the structures. Application on the tensile side allows for more affective and economical structural interventions.

Adaptation for current design models is needed.

## Methodology

Development of the technique started with two way reinforced bonded concrete overlay applied to a flat slab-column connection under vertical monotonic loading were performed.

For the development of the design model, one way reinforced bonded concrete overlay models are being carried out to assess the behavior in one direction, which will then allow to extrapolate for the two direction case in reality.

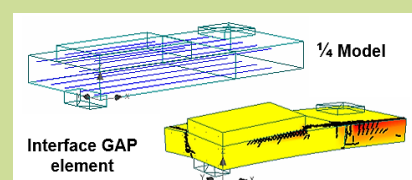
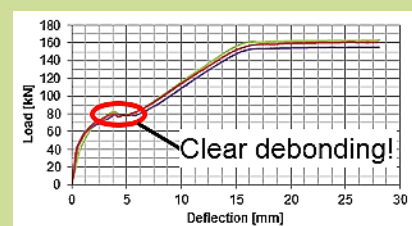
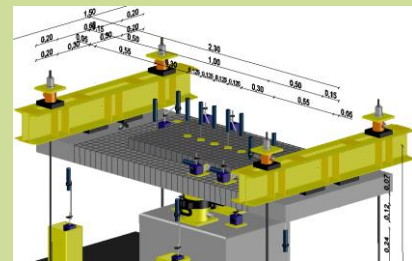
Numerical design models are being developed as well to help understand the phenomenon between the concrete layers.

## Expected Results

Preliminary results showed an improvement of almost 50% in the resisting strength using this technique, if the flat slabs layer's behavior were monotonic.

Current tests will allow to develop and tune the design model for this strengthening technique. Current model results for several solutions are showing an improvement of more than double the bond stress at the interface level.

Numerical results allow to estimate the maximum bond stress between the concrete layers and tune the design model.



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