# DYNAMIC ANALYSIS OF COMPOSITE STEEL-CONCRETE SECTIONS WITH SCREW SHEAR CONNECTIONS

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The use of composite steel-concrete sections systems with shear connections has increased in the last years in Colombia. This increase is due to the great advantages offered by the composite systems in comparison with the traditional system. These advantages are reflected in cost reduction.

The Colombian specifications for the design of composite sections are based on the AISC-360 code. In this code, just two shear connection types are specified: Headed Studs and Channel. The headed studs have been poorly marketed so far in Colombia, which has led the industry to use screws as a replacement of these.

Consequently, several educational institutions in the country, including the National University of Colombia have carried out experimental research work for different configurations of composite sections. In one study (Hurtado, X., Molina, M., Linero, D., 2008) a formulation was determined for the design of screw shear connections in composite sections with I-beam steel and no-reinforcement solid concrete slab. This formulation was adopted and included in the NSR-10 specifications. While this formulation represents a first approach to the knowledge of the behavior, it cannot be used for the design of composite sections that have different characteristics. In another study (Larrañaga, S., Molina, M., 2007) it was not possible to obtain conclusive results for composite sections with cold-formed steel section, since unforeseen events occurred in the physical tests, such as local buckling of the steel profile.

This research aims at making a significant contribution to the knowledge of the behavior, both static and dynamic, of composite sections with screw shear connections in I-beam configurations and cold formed steel cross-section with solid concrete slab. This is due to the fact that, on the one hand, there are no conclusive results for cold formed steel cross-section, and, on the other hand, the study of the system behavior under dynamic loads has not been carried out. This becomes an important issue because of the high seismic risk conditions present in our country.

The study will be conducted through physical testing and nonlinear numerical simulation. This will result in formulations as well as recommendations and limitations for the use of screw type connections will therefore be identified. In the physical testing phase, push-out tests will be performed under static monotonic loading (Viest, I., 1956) and reverse cyclic loading (Civjan, M., Singh, P., 2003); additionally, substructure tests at full scale will also be carried out subject to reverse cyclic loading (Bursi, O., Gramola, G., 2005). In order to do so, several variables will be considered, such as the separation and diameter of the screws, the reinforcing of the slab and the concrete compressive strength.

Keywords: Shear connections, Push-out test, Composite section, Cyclic loads, Non-linear analysis.