Abstract

This seminar will focus on large scale testing of structural elements and in particular on innovative steel-concrete composite elements. The work that will be presented is part of the impact case submitted at the last REF. The speakers will present test procedures, results and design aspects of Bi-Steel panels and composite shallow floor cellular beams.

Bi-Steel comprises two steel plates that are connected together to form panels which incorporate an array of friction welded transverse bars. The void between these panels is then filled with concrete to create a composite material with outstanding strength and performance. This system is widely used, especially in structural building cores and are manufactured off-site and the panels, or modules (consisting of two or more panels) are then transported to the project site where they are quickly and accurately assembled to form the core. When this is fully erected the panels are filled with concrete to create a robust structure with outstanding strength and stiffness.

A new type of composite shallow floor cellular beam has been developed to minimise the overall structural depth and provide service integration. The new composite shallow floor beam consists of an asymmetric steel section with regularly spaced web openings and a concrete slab incorporated between the top and bottom flanges. The web openings are filled with in-situ concrete when the floors are cast. The longitudinal shear force is transferred by the concrete plugs passing through the web openings, acting with or without reinforcing tie-bars. The experimental investigation of the shear transferring mechanisms and flexural bending tests on a full-scale beams will be presented.

Bio

Dr McKinley has over 15 years experience of the design, instrumentation and implementation of physical test programmes for research and commercial product development in the field of structural engineering that includes product development and validation of third party designs. His particular interests include the assessment and durability of existing structures, steel and concrete composite structures, concrete durability, sensors and instrumentation.

Professor D'Mello is currently a Professor of Structural Engineering at City University of London. His research work is largely in the area of very large scale testing, both in the laboratory and on location on oil rigs and large office buildings. The main focus is on composite structures, starting initially with grouted connections in offshore structures and currently on long span composite floors in buildings. All of the research work has been linked to industrial need and much of it has been supported by UK and European funding bodies and by industry. A further area of research has been in the area of dynamics of structures, particularly on the dynamics of long span floors. Professor D'Mello’s current research activity is on long span floors and particularly on the ultra slim floor beam, in which the floor slab is incorporated within the beam depth.