# COMPOSITE STEEL-CONCRETE FLOOR SYSTEMS

## A.R. Kemp

# Abstract

The type of composite floor system investigated during this project consists of a reinforced concrete slab spanning in one direction between parallel steel girders. The composite action between the slab and the girders is provided by stud shear connectors. Emphasis was placed on the properties of the floor system at ultimate load.

Two series of tests were conducted to examine the dual function of the slab in supporting floor load and acting as the upper flange of the composite beam. In the first series, six continuous beans were loaded to failure on two 10" – 6" spans. Five quarter-scale floor systems, in which the slab was transversely continuous over three parallel girders, were tested in the second series. In all these experiments the load was distributed over the slab so that the interaction between the slab and beam failure mechanisms could be studied. The ratio of the overall slab width to the length of the sagging moment region of the beam was in the range 0.26 to 0.40, which is greater than that covered in previous composite beam tests.

The results of earlier research on similar structures are summarised in the introduction. The accepted ultimate and working load equations for composite beams are derived in a form suitable for computer programming. The properties of the concrete compressive stress block at ultimate load are described in detail. A theory is proposed for determining the variations in strain across the slab flange at ultimate load. Expressions are also derived for the strength of the slab when it is subjected to transverse bending moment and vertical and horizontal shear forces. The experimental observations are compares with the results predicted by these theories. The conclusion arising from this comparison and their applications in the design of composite floors are described in the last chapter.

The results of this project have emphasised the importance of shear forces in the plane of the slab and transverse bending of the slab. Design formulae are given for the effective width of the slab in the sagging moment region of the beam and its strength under combined transverse bending and shear.