

ALUCONCRETE COMPOSITE BEAMS AND ARCHES

A.K.A. Razak*

Civil Engineering Department, Universiti Malaysia Sarawak, Malaysia

T.M. Roberts

Department of Civil and Structural Engineering, Cardiff University,
Wales, United Kingdom

R.J. Bridle

School of Engineering, Cardiff University, Wales, United Kingdom

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ABSTRACT

The results of an experimental investigation and theoretical study of aluconcrete composite beams is presented. Materials used to form the composite structure were a ready made extruded aluminium channel section beam and high strength concrete (HSC) with a grade of 100 N/mm². The basic properties of the materials were determined by conducting the following tests; i.e. tensile tests on aluminium; cube compression tests; tensile splitting tests; and cylinder torsion tests. The aluconcrete composite beams were subjected to four-point bending to assess their ultimate bending resistance. Based on the plastic behaviour of the materials used and cracked section analysis, a theoretical study was performed to assess the ultimate bending resistance of the aluconcrete composite beams. Comparison between theoretical and experimental results was performed to validate the analysis. A good correlation was obtained between theoretical and experimental results. The application of the aluconcrete composite section to form the structural member (barrel) of the arch bridge was assessed. The results of the assessment show that the aluconcrete composite section could perform satisfactorily as the barrel of an arch bridge for loading of 80 kN per meter width.

Key words: Aluconcrete; Aluminium; High strength concrete; Composite beam; Arches

1. INTRODUCTION

Aluminium is a material that has a wide variety of uses because of its outstanding characteristics of strength, stiffness, lightness, durability, versatility, and ability to resist corrosion. Tensile strength is not significantly affected by temperature fluctuation in atmospheric conditions, but