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COMPOSITE SECTION OF REINFORCED
CONCRETE AND PRE-STRESSED CONCRETE

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SYNOPSIS

This project is primarily aimed at the study of the behaviour of a composite section under load. The composite structure under study was a T beam made up of a post-tensioned (bonded) prestressed web and a reinforced concrete flange. For a structure to behave compositely, the different elements or parts that make up the structure must act together. This requires that they are bonded suitably such that the elements do not act separately when loads are applied. This provision was successfully satisfied by using shear connectors to link the web and the flange.

In this project, the samples consisted of four T-beams, 3 metres in length and of identical cross sections and relevant grades of concrete. However, the number of prestressing wires were different for each beam. Each wire was stressed to 70% of its characteristic strength. This meant that each beam had a different amount of prestress and it was proportional to the number of wires present. The flange was only constructed after the web had been prestressed.

Testing was carried out 28 days after the flanges were constructed. The testing constituted of applying two point loads at the required points on the beams. The beams were simply supported at the ends. As the load was gradually increased, strain readings at the mid-span, deflection, crack widths, crack lengths and crack spacings were measured for each beam. The cracking loads and ultimate loads were noted down. Testing was discontinued when the ultimate load was reached.

A comparison between the experimental and theoretical values was then made where possible. The experimental results of the 4 beams were also compared. The effects of different prestressing forces could be deduced from the comparisons. Furthermore, the general behaviour of this type of structure [beams] under load could be observed.

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