

Assessment and Retrofitting of Structures

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ABSTRACT

Numerous concrete and steel structures require retrofitting due to various reasons such as ageing, environmental attack, increase of load, change of function, design or construction errors. Retrofitting is also required to avoid/mitigate disaster. In order to determine retrofitting schemes and methods that are most desirable in terms of costs and technical advantages, it is essential to do a structural assessment of a given structure. This study introduces the principles of assessing and retrofitting of structures and also the relevant modern retrofitting techniques. A few examples of retrofitting structures with materials such as steel and concrete, pre-stressed concrete and fibre reinforced polymer (FRP) composites are included. Practical applications of seismic structural retrofitting are also discussed.

The structural condition assessment procedures and guidelines include preliminary investigation and planning, condition surveys, material testing (destructive and non-destructive testing) and field load testing. A structural analysis is performed following these procedures and guidelines, and the data collected forms the basis of the final conclusions made. Once it has been decided to retrofit, a detailed structural analysis is a requirement, and is usually based on loads and stresses specified by the client. A detailed structural analysis should have two objectives: (a) to take advantage of the methods available today with emphasis on structural behaviour, and (b) to identify those elements that need retrofitting. Based on the results of structural assessment and the detailed structural analysis, the method(s) and material(s) for retrofitting are proposed. Where deficiencies are observed, retrofitting should be combined with the necessary level of repairs. If the structural analysis is satisfactory, the proposed retrofitting will be implemented. Otherwise the structure is re-analysed considering some more improvement of retrofitting method(s) or material(s) until it satisfies the required improvement of the structure.
