



Advances in Materials and Technologies for Sustainable Rehabilitation and Maintenance of Concrete Bridges

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Deterioration of the aging civil infrastructure such as roads and bridges is well documented worldwide. In the United States and Canada, nearly 50 percent of the bridges are older than 40 years. The cost of renewal of aging bridges and infrastructure in Canada has been estimated in the order 125 billion dollars. Considerable efforts have been made in recent years to develop intelligent bridge management strategies to reduce maintenance cost, enhance the service lives of these structures, and ensure public safety. Such strategies must involve sustainable repair and retrofit strategies, and performance monitoring of infrastructure using smart, energy-efficient and durable sensors. Advanced composite materials such as, fiber reinforced polymer can be used for repair and rehabilitation of aging infrastructure to achieved higher durability of traditional reinforced concrete structures. Periodic visual inspection is a common method of detecting problems in concrete infrastructure, particularly bridges. These inspections can only detect deterioration after it has reached certain levels. The reliability of Bridge Management Systems depends on the quality of visual inspection and the reliable estimation of bridge condition rating. However, Visual Inspection is known to suffer from subjectivity and incompleteness. A better understanding of the real behavior of a structure can be achieved by an appropriate monitoring system that can be easy to adopt and can help diagnose the structural conditions in order to take appropriate measure to prevent failure in a structure. Digital image processing techniques are also found to be very useful in automated condition assessment of concrete structures and supplement the information obtained from Visual Inspection. The presentation will focus on the integration of these materials, and monitoring techniques to maintain and develop sustainable bridge infrastructure in Canada.