EuroSciCon

8th International Conference on

Smart Materials and Structures

August 01-02, 2019
Dublin, Ireland

Armin Mehrabi, Nano Res Appl 2019, Volume 05

Development of smart materials and structures should anticipate evolution of structural systems and construction methods

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To facilitate application of smart materials and structures, one must consider the evolution of structural systems and construction methods. In other words, if we work on developing smart materials and structures having in mind current conventional structures and construction methods, by the time our product is ready, the structures and systems might have evolved to something different and the implementation might become obsolete. As an example, there is a substantial movement toward accelerated construction methods. One such approach deals with Accelerated Bridge Construction (ABC) that is defined as design, planning and construction methods to organize and arrange construction activities for new bridges, as well as repair, replacing and rehabilitating of existing bridges so that onsite construction time and mobility impacts are reduced, and public and worker's safety is enhanced. The method relies heavily on using pre-fabricated modular bridge elements and assemblies that addresses some of the major drawbacks of the conventional bridge construction methods including delays to allow concrete curing, time constraints due to sequential construction, traffic interruptions and safety issues, compromise in quality for *in situ* activities, dependency on weather, etc. Recent tendencies toward automation and robotics also agrees well with the ABC notion. The inherent unique characteristics of ABC may also require unique materials and technologies for making the structure smart. This presentation attempts to discuss the characteristics of ABC and expectations on materials and technologies that would facilitate construction and maintenance of such structures in a smart manner.

Biography

Armin Mehrabi is an Associate Professor and ABC-UTC Director of Research in the Civil and Environmental Dept. of Florida International University (FIU). Before joining FIU, he served as the President of the Bridge Engineering Solutions specializing in inspection, evaluation, cable vibration and wind assessment, health monitoring, and rehabilitation of cable-supported bridges. He has published extensively on inspection and evaluation of bridges, laboratory testing and seismic analysis of masonry and infilled frames. His current research includes NDE, health monitoring and maintenance decision making, development of guidelines for ABC substructure selection, redundancy of steel box girder bridges, and precast prestressed pile splices.

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