Sustainable and self-sensing concrete: new findings and applications in railway infrastructures

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The Concrete Society EVENTS

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Technical Presentation
Sustainable and Self-Sensing Concrete: New Findings and Applications in Railway Infrastructures

Tuesday 11th February 2020
5:30 pm for 6pm start

at the University of Birmingham, Murray Learning Centre, Room LC-UG09

The presentation will look at the following

- Why concrete is currently neither environmentally nor economically sustainable.
- Alternative solutions to solve the sustainability issue of concrete.
- Lack of self-monitoring ability of concrete for failure or changes in the structure.
- Factors influencing the self-monitoring ability
- Performance of rubberized concrete with CNT (Carbon nano tubes).
- Case studies for applications in railway infrastructure systems.

Speakers: Xu Huang and Sakdirat Kaewunruen

Presentation should last 30-40 minutes with questions

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SUSTAINABLE AND SELF-SENSING CONCRETE: NEW FINDINGS AND APPLICATIONS IN RAILWAY INFRASTRUCTURES

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ABSTRACT: The majority of civil infrastructure is constructed using concrete materials and currently concrete production is at all time high resulting in significant carbon dioxide emissions. Furthermore, concrete structures have low tensile strength and low ductility increasing the risk of failure. Therefore concrete is currently neither environmentally nor economically sustainable. This experimental investigation has been highly promising in identifying an alternative solution to solve the sustainability issue regarding concrete. Our critical literature showed that there have been successful in identifying the most optimum solution to solve the issue of carbon dioxide emissions related to concrete production but concrete structures still lacks of self-monitoring ability for failure or any changes in the structure. This paper will identify the factors that influence the self-monitoring ability as mainly the conductive filler, fabrication and dispersion, which are the critical parameters. Experimental study has been carried out to identify the most environmentally sustainable solution with a minimum of 50MPa strength. We have investigated the performance of rubberized concrete with CNT (Carbon nano tubes), which enables self-monitoring ability and reduces carbon dioxide emissions by 140kg per meter cube of concrete produced in comparison to a meter cubed of ordinary Portland cement concrete. Case studies for applications in railway infrastructure systems will also be highlighted in this presentation.

KEYWORDS: Concrete, Sustainable material, Self-sensing; Self-monitoring; Innovative material; Carbon nanotubes

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