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Title: Inspection of engineered composites for sustainable construction

Structural Health Monitoring (SHM) and Non-destructive Inspection (NDI) are two concepts, strongly connected to sustainability. They enable prioritization of the different structures based on the necessity of repair, as well as pro-active maintenance before damage in a structure becomes extensive and requires costly repair or even demolition and new construction. Acoustic NDI in its passive (acoustic emission) and active (ultrasound) form is a great alternative for monitoring as it allows detection and localization of damage even in 3D objects and characterization of the fracture mode. While it has proven its capacity in several domains, new challenges are continuously arising, largely due to new materials. Engineered cementitious composites are characterized by increased strength and more importantly toughness but their fracture behavior is not well documented yet. Their heterogeneity and thin, layered structured put in question the knowledge transfer from more traditional domains, like bulk concrete, where elastic wave assessment is more conventionally applied. This mainly refers to differences in fracture behavior as well as the interpretation of the AE waveforms because of differences in propagation conditions. Therefore, the goal is to develop a system that can:

1. Detect and localize damage in composites for construction.
2. Characterize the type (mode) of damage.
3. Combine different techniques for global characterization (acoustic, optical, electromagnetic).
4. Check the possibility for repair (self-healing included).
5. Reconsider the design of components combining the need for light weight, sustainability, susceptibility to easy NDI, as well as high mechanical performance.

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Research Group: <https://researchportal.vub.be/en/organisations/mechanics-of-materials-and-constructions>

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