

Smart cementitious composites

Development of multi-functional printable SHCC

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Propositions

accompanying the dissertation

SMART CEMENTITIOUS COMPOSITES

DEVELOPMENT OF MULTI-FUNCTIONAL PRINTABLE SHCC

by

Stefan CHAVES FIGUEIREDO

1. Intense monitoring of structures is costly however, necessary if society wishes to use its infrastructure in full capacity.
2. The use of automation is crucial for humanity to provide a safe and productive society.
3. Understanding the fresh properties of cementitious materials is complex. The construction industry is used to work with simple and straight forward tests based on batched samples to assess these properties. However, this might need to be changed to continuous and more elaborated tests to fully control the quality of extrusion-based 3D printing of cementitious materials (This proposition pertains to this dissertation).
4. Addressing the reinforcement issue in 3D printing is crucial and many possibilities are available. Fibre reinforcement may bring a compromise between a less disruptive industrial technology and a robust reinforcement technique (This proposition pertains to this dissertation).
5. Enhancing the properties of building materials may also bring additional complexity to the industry, such as recycling and compatibility. Therefore, the use of these materials should be limited.
6. Additive manufacturing addresses the desire for exclusive solutions and at the same time offers the possibility to optimize the use of resources. Anyhow, increasing shape complexity and the manufacturing of unique elements might make the reuse of these pieces more difficult.
7. The reuse of steel reinforced concrete elements is limited to the ageing of each individual component. Therefore, cementitious composites reinforced with non-metallic fibres might be a better solution to the construction industry enhancing the capability of reusing these elements before recycling.
8. New environmentally friendly technologies should also be profitable otherwise they will not be applied.
9. The construction industry should be conservative and slow to apply new technologies.
10. “It does not matter how slowly you go as long as you do not stop.” Confucius.

These propositions are regarded as opposable and defendable, and have been approved as such by the promotor prof. dr. ir. E. Schlangen and the copromoter dr. ir. O. Çopuroğlu.