UNIVERSITY OF CAMBRIDGE
Department of Engineering

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

3D printing – A Viable Construction Aid?

Construction projects, especially those of a complex nature, are often blighted by rising costs and delays when dealing with bespoke or specialist items when lead in times for such items are underestimated, the items get damaged in transport or during construction and when they are fabricated incorrectly. Such issues can be avoided with the use of 3D printing technology. This removes the waste in the lead in periods and lowers the cost as when using 3D printing technology geometric constraints are not limited.

The purpose of this research is to determine if is it viable to have 3d printing facilities on site or at an offsite facility that can be used to produce one off components when required to support a project.

The method for determining the viability of 3D printing in this application has been via literature review and researching current capabilities in other industries to find transferable uses. Case studies on projects that have been subject to delays due to the issues already described or that have rising cost due to bespoke items being required have been carried out along with a detailed cost analysis . These case studies will be crossed reference with the literature review to ascertain if 3D printing can solve the problem and if using or having a 3D printer on standby to solve these issues is commercially viable.

The research points towards 3D printing capabilities being a viable and valuable addition to the capabilities of a construction business and will lessen the waste in terms of delays for one off special or bespoke items as well as making them more affordable in the first instance. One example of this is Koenigsegg's One:1. A bespoke car (only 7 made) whereby the turbo was 3D printed out of titanium due to the fact that casting it proved expensive and in fact did not work due to the complexity of the turbo. This proves 3D printing is advanced enough to aid with complex components for mechanical and electrical systems.

There are however some barriers to consider and overcome such as complying with building regulations and European standards, ensuring the printers are adaptable enough to be able to produce the resolution required, being able to accept the aesthetic issues which can be present in printed objects and actually being able to obtain the 3D designs for the object required. Good guidance and governance is therefore required around this technology however 3D printing does open doors for creation and innovation making new ideas and designs far cheaper to prototype and test.

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