



Digital Design & Semi-Automatic Fabrication: Digital Craftsmanship

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Abstract

Structurally informed Digital Craftsmanship has the potential to transform how the built environment is made and built using exactly crafted, locally sourced materials to create attractive and robust structures that require minimal material resources, site skill and time to construct.

Digital design tools can improve the quality and engineering efficiency of many types of building through the digital fabrication of common building materials. Computer controlled fabrication machinery driven by digital design information can create structurally and thermally efficient building envelopes from closely fitting bespoke parts.

Keywords: Digital; Design; CNC; Mass Customisation; Fabrication; Craftsmanship; kit of parts; robot; making; building.

1 Introduction

Digital design as a subject was explored in the IABSE Henderson Colloquium in July 2014. The colloquium looked at the wide range of this subject, which is summarised on IABSE's website. The following specific areas were looked at

- parametric modelling
- design optimisation, visualisation, and documentation
- design collaboration
- construction automation
- the impact of big data and open source design
- the impact on education, training and skill development

This paper focuses on a reasonably narrow band of the digital design spectrum, where construction automation is enabled by bespoke digitally

designed information, which this author refers to as Digital Craftsmanship.

2 Digital Craftsmanship

Traditional craftsmanship is the practical expression of an expertise with a specific material or technique. Craftsmen are also known as Artisans who design what they make as an inherent part of the making process.

In a similar way, Digital Craftsmanship is work by designers; usually engineers and architects, using computer design tools to make components that come together to make crafted buildings and other structures.

There are two core principles of Digital Craftsmanship; the first is the efficient use of building materials and the second is the creation of bespoke kits of parts that respond to the unique constraints of the project and are designed to facilitate their own assembly.