Graduation Plan for AE students

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Studio
Name of studio: Architectural Engineering
Teachers: Anne Snijders, Pieter Stoutjesdijk

Argumentations of choice of the studio:
During my Masters education, my personal interest and fascinations have shifted from mainstream architectural to design and making of smaller scale objects and prototypes with a focus on craft and technique. The Architectural engineering graduation studio is the most suitable platform to make a project driven by personal fascination on a chosen scale where the technical focus of the studio enables me work ‘hands on’ and to play to my strengths.

Title
Ruin Prosthesis, Building on the remnants of history with the technique of the future

Graduation Project

Problem Statement
Inclusion of digital techniques in production can amount to fundamental changes in design. Design can be more specific, more detailed and less repetitive because the production of unique elements has become as efficient as the production of identical ones in the process of digital fabrication. This customization of design is especially relevant in architecture. Here specific site conditions, culture, personal preferences etc. make each project unique. The challenge that is in front of today’s progressive designers is to find out how and where to implement this customization. The use of digital fabrication does not only allow highly specific solutions. It demands it.

Designing on a ruin is eminently such a highly specific problem. To design an architectural extensions on to a ruins is a very charged assignment. The designer has to take a firm position and define what the role of the extension in the ensemble will be. A beneficial use for an old building makes it far more likely for the building to survive, but existing structures are often difficult to adapt to its new function. The need for a

2 M. Davies (2011). New life for old ruins, from Buildingconservation.com
practical use and the inability to damage or change the structure - either in form and in character - illustrates the field of tension the designer enters. He will have to mediate between pragmatism and romanticism. The use of digital capture and fabrication could be the tool to make that join in a more specific, more customized and more elegant way than before.

The Parkstad region in Limburg is a troubled region that deals with population shrinkage, building vacancy and a regional ‘identity crisis’ after a shift away from the old mining industries. The region is surrounded by a beautiful green landscape that contains many castle ruins but the unclear boundaries and routing of the green area make those characteristics invisible at present by the unclear division between park and city. The region needs clearer configuration routing and purpose for its green area’s in order to rise to its name: parkcity. A International building exhibition (IBA) will be held in 2020 and is bound to enhance the region. In its call for entries for the IBA is stated: ‘The region should be more adaptable to future changes … Flexibility, creativity and innovation are necessary to give the region new elan’. The region needs innovative solutions with the existing building stock to forge a new identity for the area.

**Objective**

The Objective of my graduation project is to conceive a method of building using digital capture (3d scanning) translated to digital fabrication, in order to build onto ruined structures. This method of ‘prosthetic architecture’ will be used to design a extension to the ruin of castle Schaesberg. This extension should provide a fully reversible and functional rehabilitation of the structure and a give cultural impulse to the area of Parkstad by both its appearance, its novelty and its program. Secondly, the design of the surrounding park should connect and give direction to the green areas of Parkstad.

**Overall design question**

*How can the ruin of Castle Schaesberg be extended to a functional building with added value to the community of Parkstad in a way that does not damages, covers or irreversibly changes the heritage value, using state of the art digital fabrication and reality capture techniques?*

**Thematic Research Question**

*how can digital capture and digital fabrication be used to build a ‘prosthetic’ connection to a monumental ruined structure?*

**Sub questions research:**

1 *What are the technical requirements and limitations of building onto ruins?*

2 *How can ruined structures be digitally captured and processed to be translated directly to production?*

3 *How can I integrate this?*
Methodologies
The research is structured in the different steps that follow from the proposed method. Each of those steps summons questions that need answering and ask for its own method of research. The research is divided into three chapters that each deal with a phase of that workflow.

The first section of this paper consists of an investigation of the technical requirements and limitations that are consequence of building onto a ruined structure. Construction onto a ruin is rare but not unprecedented and some information is obtainable in the experience of those who have built them and by studying completed projects. Research methods will be case studies of two architecture projects -chosen from multiple projects because of their interesting technical solution, architectural appearance and the availability of information. Secondly interviews conducted with experts in renovation architecture among which the project architect of Kolumba Museum should provide more insight in general difficulties and the building process.

The second section deals with the transfers from physical form to a digital model and its translation into production. The digital capture phase is the most emphasized in the research since it is the most innovative part of the proposed design method. 3D scanning is widely described in literature, but the application of this technique as direct information for production in architecture is very rare and that information is limited. Therefore the first methods of research will be a literature study to gain insight in the technique of 3D scanning. Later in this chapter we research the suitability of digital capture techniques for design and production purposes. This is done researched by design; In 4 small scale design experiments that extend from capture, to production of a prosthesis.

The third chapter is a brief investigation of how the proposed techniques and knowledge can be integrated with existing building methods for architecture. And how this will make them suitable as building methods for extension design. Research methods are literature research and research by design. This last chapter should be a test of the practical utility of the obtained information and the opportunities that digital capture provides.

Planning
See appendix page 6

Relevance
The aimed result of the graduation project is a generic method that could be used to on any given complex structure. The aim is a new tool for design allows the designer to make the join between old and new in a more specific, more customized and more elegant way than before. This could give a new insight in the benefits of modern techniques of fabrication and their potential for customization of design. Additionally, the project is an architectural exploration of how we deal with the non-functional, but valuable heritage that ruins are.
**Literature**

**Design research:**
Brans, Erik Jan, Ruïnes in de praktijk van de Rijksgebouwendienst, Praktijkreeks cultureel erfgoed afl. 15, nr. 39, SDU 2011
http://beeldbank.cultureelerfgoed.nl

**Technical research:**

**Video’s**

‘Pre-Cast Concrete Walls | How It’s Made’, broadcast by Science channel, available at https://www.youtube.com/watch?v=HO7ECuUtswc. [8-6-2015]

Legacy Walls Precast Concrete Sandwich Panels, East Coast Precast, LLC. https://www.youtube.com/watch?v=hZ0NrXiiKjM [8-6-2015]

**Websites**


**Lectures and interviews**

precast wall panel design, lecture by Edward Losch, available at http://www-dassses.usc.edu/architecture/structures/Arch613/lectures/12-concrete%20walls.pdf [8-6-2015]

Interview with Serge Schoemaker, project architect at Kolumba kustmuseum, 08-05-2015

Interview with ir. Frank Koopman, construction specialist of heritage buildings and renovation, conducted 08-05-2015

Interview with ir. Esther de Bruijn, founder at leap3d 3d scanning company, conducted 15-06-2015