Reflection
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Colophon

Reflection
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Graduation report - Rebecca Leising
Introduction

At the P3 the student has to hand in the draft reflection. The main mentor assesses whether the reflection meets the criteria below and contains at least two of the below aspects.

At P4 a final reflection must be included as a distinct part of the thesis (a separate chapter) or as a separate document.

In the reflection the student uses a short substantiated explanation to account for the preliminary results of the research and design in the graduation phase (product, process, planning). The aim of the reflection is to look back and see if your approach worked, to understand the "how and why", and subsequently to learn from this. The choice of method (how) and argumentation (why) which preceded the research was a part of your study plan – the reflection must contain an answer to the question of how and why the approach did or did not work, and to what extent.

Finally the student has to look ahead and describes how the second part of the graduation period will be filled in. Depending on the research and design, reflection on a number of the following aspects should be included (you may choose in which order). The reflection should be in the form of a text, with diagrams and sketches for purposes of illustration and clarification.

Aspect 1
The relationship between research and design

Aspect 2
The relationship between the theme of the graduation lab and the subject/case study chosen by the student within this framework (location/object)

Aspect 3
The relationship between the methodical line of approach of the graduation lab and the method chosen by the student in this framework

Aspect 4
The relationship between the project and the wider social context

(Cited from the Graduation manual)

1 Relationship between research and design

This graduation project studied the implementation possibilities of the Circular Economy concept to the company Klöckner Metals ODS Nederland. In the beginning of the process the intention was to use the knowledge gained from the CE for developing and designing a new circular steel curtain wall system. The literature study and analysis of the company were meant to lay the basis for the design phase, which was implied to take a central place in overall process. However, by learning more about the CE and what it means for the built environment, the focus of the research evolved from designing a new system to assessing the circularity of curtain wall systems. In this way, more emphasis was given on the research process than on the actual design.

In the end the design phase was still executed as intended, but it only took a smaller part in the overall project. Based upon the research findings of CE and an analysis of the existing curtain wall systems, design criteria for
system improvement were formulated. This leaded to the development of several hybrid facade systems. From these variants one has been selected for further development and assessment. Currently a proper assessment method for assessing the circularity of façades does not yet exist. In order to evaluate if system improvement is even necessary, as suggested, a proper assessment method had to be developed.

In the assessment three curtain wall systems were compared, to see which one had the most potential for a circular construction industry. The assessment criteria are based on the knowledge gained from the literature research and serve as general guidelines for optimization suggestions regarding circular facade design. So eventually the design phase has shifted from designing a completely new circular curtain wall system to designing an assessment method.

2 Relationship between the theme of graduation lab and chosen subject

For the Building Technology graduation studio students are expected to compromise a technical-scientific study and design research or execution of a design. The emphasis of the graduation lab lies on sustainability-related topics of Structural Design, Facade Design and Climate Design. This graduation project is clearly linked to the theme Facade Design as it studies the circularity of façades and specifically curtain wall systems. The focus on Circular Economy and the establishment of a circular construction industry underlines the relation of the graduation project to the broader sustainably context of the studio.

The specific focus on the company ODS NL has led not only to studying the technical possibilities of creating more circular façades, but also to the strategic more business oriented aspects. Eventually the two fields where combined to create and suggest an overall sustainable strategy that should help ODS NL strengthen their position in the market and in the durability discussion. It moreover will contribute to a general establishment of a more sustainable steel (curtain wall) market and contributes to the existing knowledge around circular construction in general.

As a result, the outcome of this study is not typical for a graduation project within the Building Technology master track, from which would be expected to have a focus more on architectural design. On the contrary, this research relates perfectly to the Industrial Master Strategic Product Design. This is partly caused by the focus of CE on product design and the products offered by ODS NL.

3 Relationship between methodical line of approach of the graduation lab and the method chosen by the student

The method provided by the Building Technology graduation studio suggests a sequence of three main phases: literature review, design and evaluation. The whole process is spread over three quarters and focusses on five P (presentation) assessments. Since this research involved a company, the extensive literature review was followed by an analysis of the companies organisation and product. The design phase followed just than and resulted in a significantly smaller share in the overall project than was intended at first. Nevertheless, the result could be used well in the created assessment method and contributed to the overall strategy and view on circular facade design.
Figure 1 - Exploded views of the three different curtain wall systems.
The chosen assessment methodology is a first attempt to create a means of evaluating facades on their degree of circularity. The assessment combines the MCI method of existing literature with own developed process based scenarios.

4 Relationship between project and wider social context

Looking at the building industry there can be stated that current ways of construction and demolishing buildings are putting a big burden on our planet. This sector alone is already responsible for 50% of the waste in Europe, 40% of the global CO2 emissions and it consumes more than 40% of the materials entering the global economy. This calls for a drastic change in the way we built, whereby smarter and more efficient use of raw materials is necessary to sustain prosperity and reduce environmental impact.

To accomplish this change, we need to shift our current linear model into a circular one, where material loops are closed and waste is used as a resource again. For the establishment of such a circular building industry, buildings should be designed and constructed differently. This asks for a complete different way of thinking, doing business and component design. Although, the concept of the Circular Economy is a well known phenomenon in the product industry, it is still a new approach for the built environment and practical tools and knowledge are lacking. This asks for a better investigation and implementation of the CE to the building industry.

This graduation research explores the obstacles and possibilities of the implementation of the CE to the building industry and what sort of business and design strategies are required. In this way, this study will enrich the existing research. At the same time, the graduation project is linked to an existing company and the research findings are put into practice. As explained by the first aspect, are different facade variants developed through knowledge gained from both literature research and practice. Moreover, an assessment method has been developed to evaluate the circularity of façades and showed that design improvement is needed for the traditional curtain wall system.